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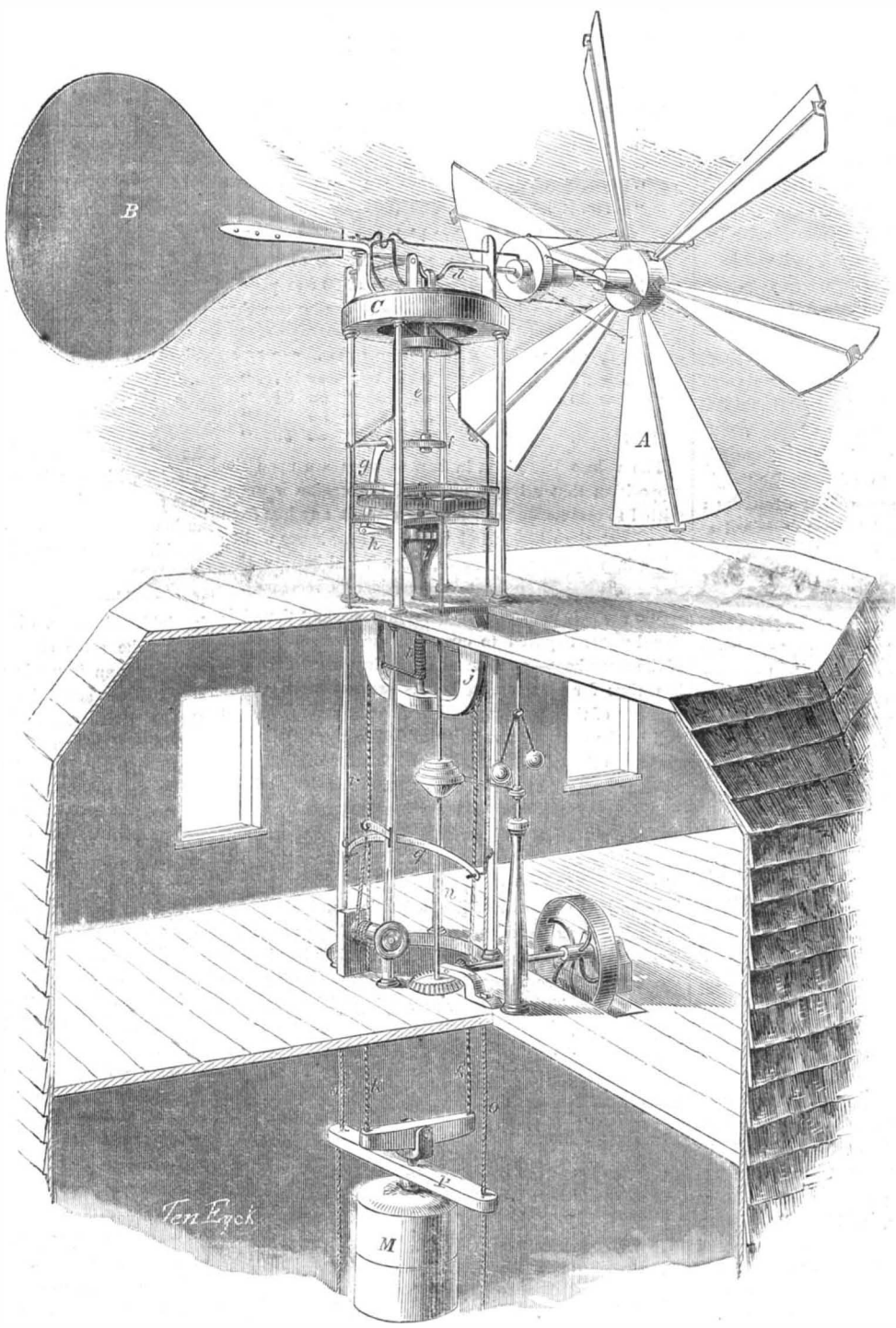
## POWER-ACCUMULATING WINDMILL.

We invite the attention, not only of the users of windmills, but of all those also who are interested in novel mechanical contrivances, to the invention here illustrated. As the idea might be applicable in many varieties of mechanism, and therefore lies in the path of numerous inventors, we could at first hardly believe that so simple and neat a device had been overlooked until the present time. But as the claim exactly covering the plan has been passed upon by the Patent Office, and as the idea has not been met with by our own experienced corps of examiners, we presume it is really new, and it is no doubt of sufficient importance to hereafter take its place in tables of mechanical motions.




LUM'S POWER-ACCUMULATING WINDMILL.

The plan is to attach the machinery to a spindle which is turned by a cord wound around it, a weight being suspended at the end of the cord, and at the same time to wind up the weight by a fly revolving loosely around the spindle, the fly being connected with a windmill.

The windmill, A, in the annexed engraving, is connected with the vane, B, and the revolving cap, C, in the usual manner, so as to be kept facing the wind. As the shaft, *d*, revolves, it imparts, by means of the crank upon it, a reciprocating motion to the rod, *e*, which is attached to an arm on the end of the rocking shaft, *f*. The rod, *g*, also attached to the rocking shaft, *f*, has the forked pair of pawls, *h*, upon its lower end, which actuate a ratchet wheel upon the sleeve, *i*. This sleeve is connected with the fly, *j*, which is thus caused to revolve by the revolutions of the fan. Two cords or bands, *k k*, pass through the fly, and are wound in opposite directions around the spindle, *l*, so that the rotations of the fly raise the weight, M, by winding up the cords, *k k*. The spindle, *l*, passes loosely through the sleeve, *i*, and is connected by the gears at its top with the shaft, *n*, which turns the machinery. A regulator, connected with a friction brake, is also introduced in the usual manner. The office of the ropes, O O, is simply to guide the weight in its ascent.

When the weight has been raised to as great a hight as permissible, the crossbar, P, comes in contact with the forked lever, *q*, which is connected with the rods, *r r*, these rods supporting at their upper end the ring, *s*. The bent lever, *t*, rests upon this ring, and is connected with the bend in the rod, *u*, and this rod operates the collar, *v*, upon the shaft, *d*, which is connected by rods with the fans of the mill, and regulates its velocity by turning these fans at a greater or less angle to the wind, in the usual manner, the object being to bring this regulating apparatus into operation only after the weight has been drawn up as high as it can be.

The patent for this novel invention, which we have no doubt will be found hereafter in numerous combinations, was issued, through the Scientific American Patent Agency, June 21, 1859, and persons desiring further information in relation to it may address the inventor, James K. Lum, at Braintrem, Pa.

## NEW STEAMBOAT LAW.

A bill is now before Congress for amending the present steamboat law, so as to secure better protection of life to passengers in all classes of steam vessels. Sea-going steamers, tug and ferry boats are exempted from the present inspection system, and the object of the new bill is to include all steam-propelled vessels under the same system as that which now governs river passenger boats. We have always contended that steam vessels of every class should have been included in the present law, and they were so embraced in the first draft of the bill, but we are informed that a great proprietor of ferry boats and steam ships, in this city, had sufficient influence to have his own vessels exempted, by striking out all that related to ferry boats and steam ships.

The new bill provides for several necessary reforms, especially the prevention of such over-crowding of the California steamers as is wont to take place weekly. It also increases the number of Boards of Inspectors.

When this bill was before the House of Representatives on the 27th ult., Mr. Gartrell, of Georgia, said its passage was demanded by the interests of the great masses of the people, and opposed only by monopolizing shipowners. Hon. H. F. Clark, of New York, opposed the bill. Its further consideration was postponed for two weeks. We are afraid that this laudable and necessary amendment to the present steamboat law will meet with the same fate which met its predecessor last year—killed by postponements.

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LAW OF BRIDGES.—Judge Lowe, of the United States Circuit Court of Iowa, has rendered a decision that the bridge at Rock Island on the Mississippi, near Davenport, is a nuisance, and that the company which owns it must remove the main pier by the 1st of July next, and the lower pier by the 1st o. October. The plaintiffs in this case were the St. Louis Chamber of Commerce; the defendants, the company which put up the bridges. The application for an injunction was based upon the complaint that the bridge obstructed the navigation of the river. We understand the case will be taken to the Supreme Court of the United States, on appeal from the decision of the Circuit Court. The case is attracting much attention on account of the principles involved.

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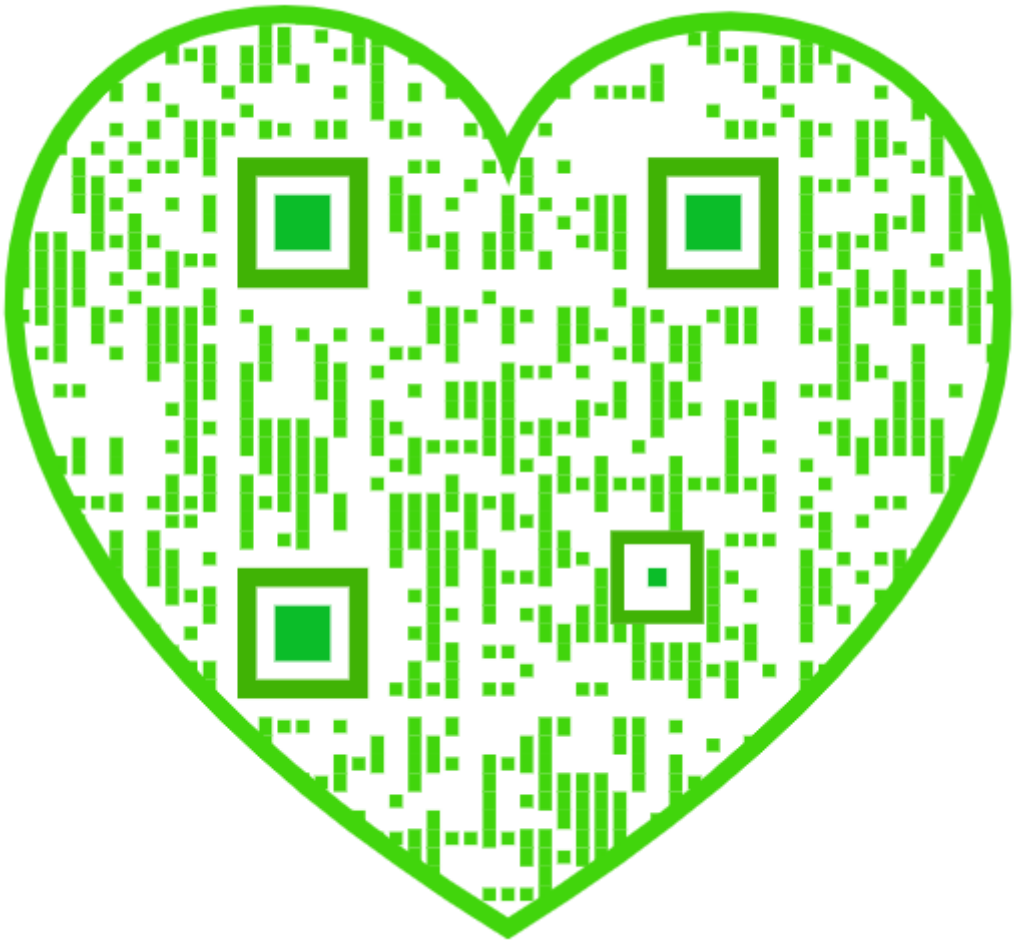

## THE OBSTRUCTION TO THE NAVIGATION OF RIVERS CAUSED BY THE PIERS OF BRIDGES.

BY J. W. SPRAGUE.

We have now reached this result—the condition of a steamboat attempting the ascent of a draw is similar to that of a body ascending an inclined plane, whose length ($l$) is equal to the length of the boat, and whose hight ($b$) is equal to the hight of *remou*. The velocity ($v^o$) of the water, through which the ascent is made, is the arithmetic mean of the original velocity ($v$), and of the increased velocity ($V$), so that $v^o = (v + V) \div 2$.

If we drag a weight up a stationary inclined plane whose length is $l$, and height, $b$, the power expended will be just equal to that required to move the weight through the horizontal distance, $l$, and then lift it vertically through the distance, $b$. Let the inclination of the plane be so slight that the friction of the weight is sufficient to prevent it from sliding down. No power is expended until we attempt to move the weight up the plane; to keep the weight just where it is requires no power.

Next, suppose that the *inclined plane has a motion of its own*; the direction of this motion being downward, and lying in the line of the plane; the velocity of this motion being such, that in one second every point of the plane will be carried *horizontally* a distance $v^o$. Hence $v^o$ will be its horizontal velocity, but will be as much less than its actual velocity, as the base of a right-angled triangle, whose length is $l$, and whose perpendicular is $b$, is less than its hypothenuse. Under this supposition, and no power being expended upon the weight, at the end of one second the body will have moved with the plane through a horizontal distance $v^o$, and will have descended through a vertical distance, $v^o (b \div l)$. If, then, a sufficient power had been expended merely to keep the weight from moving, the measure of that power would be a power sufficient to move the weight through a horizontal distance, $v^o$, and to lift it through a vertical distance, $v^o (b \div l)$. It will be observed that this is the measure of the power required every second, merely to hold the weight in its original position, and is entirely additional to the power required to advance the weight up the plane. The position of a steamboat ascending a draw is similar to that of the weight just described as resting upon an inclined plane, which is moving in a direction opposite to the motion of the boat.

The measure of the power required to overcome the resistance arising from the *horizontal* motion of the boat and the current may be neglected at present, in order to determine the measure of the power required to overcome the resistance arising from the *vertical* motion of the boat and the current. Let W represent the weight of the boat in pounds; $t$, the number of seconds occupied in making the ascent. The power required merely to resist the vertical motion of the inclined plane each second will be a power sufficient to lift the weight, $W$, through the vertical distance, $v^o (b \div l)$. Hence $W v^o (b \div l)$ feet pounds is the measure of this power for each second of the ascent and $t\ W v^o (b \div l)$ the measure for the whole ascent. To this, which is merely the power required to keep the boat still, must be added the power required to raise it vertically from the lower to the upper level, which is $W b$; making the whole power (P) required—

$$P = W b + t W v^o (b \div l).$$
$$P = W b [1 + (t v^o \div l)]$$

This same result may be arrived at by another process. If, as before, $t$ represents the number of seconds consumed in making the ascent, or in passing over the horizontal distance, $l$, then the velocity of the ascent will be $l \div t$; and the difference of velocity between the ascending boat and the descending plane, or the relative velocity of the plane to the boat, will be $v^o + (l \div t)$. The complete vertical resistance overcome each second will be the tendency to move $W$ downward through the vertical distance $[v^o + (l \div t)]\ b \div l$. The measure of the power required each second to overcome this resistance will be $W [v^o + (l \div t)]\ b \div l$. As this power is exercised during $t$ seconds, the whole vertical power (P) expended during the ascent will be $P = t\ W [v^o + (l \div t)]\ b \div l$, which, being reduced, gives $P = W b [1 + (t v^o \div l)]$. This is precisely the same value of $P$, as found by the first analysis. It will be remembered that this value of $P$ does not embrace the power required to move the boat *horizontally* forward, with the velocity $v^o + (l \div t)$, which is the relative horizontal velocity of the boat.

An examination of the above formula shows that $P$ increases with the increase of $t$, and diminishes in value with the diminution of $t$. Hence, so far as vertical resistances are concerned, the quicker the ascent is made, the less power is required. If the inclined plane was a stationary one, the amount of power required for the ascent would be entirely independent of the time occupied in the ascent.

For future illustration, take a Mississippi river steamboat of the following dimensions:—Length, 240 feet; greatest immersed section, 160 square feet; displacement, 30,000 cubic feet; weight of steamboat and load, 1,875,000 pounds. Such a steamboat has to ascend a draw where the original velocity of three miles per hour is increased to five miles per hour. What amount of power is required to overcome the vertical resistances of the ascent, for the different values of $t$; $t = 0$; $t = 10$ seconds; $t = 20$ seconds, &c.?

The case where $t = 0$, which is, of course, an impossible one, corresponds merely to a neglect of the motion of the inclined plane. A velocity of three miles per hour increased to five miles per hour is a velocity of 4.4 feet per second increased to 7.3 feet per second, which gives for the hight of *remou* $b = 0.58$ feet. Here $W = 1{,}875{,}000$; $b = 0.58$; $v^o = (4.4 + 7.3) \div 2 = 5.85$; $l = 240$.

| | | |
|---|---|---|
| When $t =$ | 0 | $P = 1{,}087{,}500$ feet pounds. |
| " $t =$ | 10 sec. | $P = 1{,}352{,}578$ " " |
| " $t =$ | 20 | $P = 1{,}617{,}656$ " " |
| " $t =$ | 60 | $P = 2{,}677{,}968$ " " |
| " $t =$ | 120 | $P = 4{,}268{,}436$ " " |
| " $t =$ | 180 | $P = 5{,}858{,}904$ " " |

33,000 pounds raised one foot high per minute, or 550 pounds raised one foot high per second is the measure of one horse-power, which is expressed as 550 feet pounds per second. Changing the preceding values into another form—

| | | | |
|---|---|---|---|
| when $t =$ | 10 | $P$. per sec. $= 135{,}258$ ft. lbs | $= 246$ *H.P.* |
| " $t =$ | 20 | $80{,}883$ " | $= 147$ " |
| " $t =$ | 60 | $44{,}633$ " | $= 81$ " |
| " $t =$ | 120 | $35{,}570$ " | $= 65$ " |
| " $t =$ | 180 | $32{,}549$ " | $= 59$ " |

The values just given in horse-powers are upon the supposition that all the power of the engine is transmitted to overcoming resistances, without any loss from the *slip* of the wheel, friction, &c. These losses will be taken into account afterwards, when it will be seen that the values just given must be considerably increased.

We are now prepared to take into account the additional power required to overcome the *horizontal* motion of the steamboat—an element of the investigation which has thus far been omitted. As previously stated, the measure of the power required to move an ascending boat will be the sum of its velocity, added to that of the current; so that a boat ascending at the rate of five miles an hour against a current of three miles an hour will be considered equivalent to the same boat moving at the rate of eight miles an hour in still water. Experiments have shown quite conclusively that for ordinary velocities of steamboats the power expended in their motion *per hour* varies as the *cube* of the velocities, and the power expended *per mile* varies as the *square* of the velocities. We have to use the element of time, which is involved in the term "horse-power," not the element of space; hence we consider the power as varying with the cube of the velocities.

The actual (not nominal) horse-powers required to move the steamboat already alluded to, at different velocities, may be taken as follows:—

| | | | | |
|---|---|---|---|---|
| 3 miles per hour | or 4.4 | feet per second, | 8 | Horse-power. |
| 4 " | 5.8 | " | 19 | " |
| 5 " | 7.3 | " | 37 | " |
| 6 " | 8.8 | " | 63 | " |
| 7 " | 10.3 | " | 100 | " |
| 8 " | 11.7 | " | 150 | " |
| 9 " | 13.2 | " | 220 | " |
| 10 " | 14.7 | " | 300 | " |

These values are probably not strictly correct, though determined according to the best data in my possession, they are used merely for illustration. Intermediate values can be determined by simple interpolation. These values contain an allowance for slip of paddles, friction, &c. In the preceding illustration, we have seen that the equivalent horizontal velocity of the steamboat when ascending the inclined plane of the *remou* was $v^o + (l \div t)$;

| | | | |
|---|---|---|---|
| when $t = 60$ sec. | $v^o + (l \div t) =$ | 9.85 | feet per second. |
| $t = 120$ " | " | 7.85 | " |
| $t = 180$ " | " | 7.18 | " |

Hence for the power required to overcome the resistances to the horizontal motion we have—

| | | | |
|---|---|---|---|
| when $t =$ | 60 seconds | $=$ 89 | Horse-power |
| $t =$ | 120 " | 46 | " |
| $t =$ | 180 " | 35 | " |

Combining the power required to overcome the horizontal resistances with the power previously found requisite to overcome the vertical resistances, we have for the total power required to carry the steamboat, up through the draw—

| | | | | |
|---|---|---|---|---|
| when $t =$ | 60 sec., | total power $=$ | 170 | Horse-power. |
| $t =$ | 120 " | " | 111 | " |
| $t =$ | 180 " | " | 94 | " |

If, on the other hand, we had regarded the resistances as measured by the power required to move the boat horizontally, with the velocity $V + (l \div t)$ [*i. e.*, the maximum velocity of the current in the draw, *plus* the actual velocity of the boat], in addition to the power required to lift the boat vertically from the lower to the upper level, we should have by similar processes—

| | | | | |
|---|---|---|---|---|
| when $t =$ | 60 sec., | total power | $= 133 + 33 = 166$ | *H.P.* |
| $t =$ | 120 " | " | $= 75 + 17 = 92$ | " |
| $t =$ | 180 " | " | $= 59 + 11 = 70$ | " |

Indicating errors of 3, 17 and 25 per cent in the values; the true errors are really much greater, as will be shown further on, when the effect of friction and the slip of the wheel in increasing the power necessary to overcome the vertical resistances is taken into account.

[To be continued.]

## DISCOVERIES IN THE COMPOSITION OF GUMS.

M. Fremy has lately presented to the Academy of Sciences of Paris a most important paper upon the "Chemical Composition and the Production of Gums." A few days ago, if any chemist had been asked—what is gum? or—taking the purest variety known—what is gum arabic? he would probably have answered that it is a peculiar, immediate principle of the vegetable kingdom, soluble in water, containing no azote, and belonging, seemingly, to the group of ternary substances, which comprises sugar, starch, cellulose, &c. M. Fremy's researches have, however, thrown a very novel light upon the subject. Gum arabic is not a neutral, immediate principle, like starch or sugar, but a salt, composed of a base (lime), united with a very weak acid, which the author calls *gummic* acid. Gum arabic is, then, properly speaking, gummate of lime. By the influence of heat, or by that of certain concentrated acids—such as sulphuric acid—this gummic acid is transformed into a new insoluble substance, which is also an acid, and which, having the same chemical composition as the former, constitutes an isomeric variety of it; to this new substance the name of *metagummic* acid has been given. Gummic acid, and its insoluble isomeric variety—metagummic acid—contain about 41 per cent of carbon, 6 per cent of hydrogen, and 53 per cent of oxygen. These interesting results will have, doubtless, also their useful applications, sooner or later; for when it is known with what ease gum and its derivatives can be transformed into isomeric substances which are insoluble, it is probable that it will one day be discovered how to employ gum like albumine, in dyeing and calico-printing, for fixing insoluble colors.—*Photographic News.*

## SCIENCE AMONG THE BOYS.

MESSRS. EDITORS:—My brother lately took a small tumbler, filled it as full as he could with alcohol, and then filled the tumbler with cotton to the brim without spilling a drop of the alcohol. As my age is only 11 years I cannot give a satisfactory reason for the alcohol not spilling out when the cotton is put into the tumbler, though I have one which I believe is right. My reason is that the cotton is so porous that it absorbs all the alcohol, and the little that evaporates makes room enough for the real substance of the cotton. F. G.

Frankfort, N. Y., April 7, 1860.

[This explanation is undoubtedly correct. Boys ought always to be encouraged to make experiments like this for themselves. There is no other mode of education which is so impressive, so thorough, and especially so lasting in its effects. And it affords the very best discipline for the mind and character; teaching the child to test the assertions of the books by his own self-tried experiments, and to learn the interesting truths of Nature directly from herself. When James Watt pressed his finger upon the cover of his mother's tea-kettle to see if the steam pushed it up, he was learning a lesson more valuable than any he ever acquired at school.—EDS.

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## IRON COMBINATION BEAMS FOR BUILDINGS.

[Concluded from page 230.]

Mr. Fairbairn and other writers have given altogether too much prominence to frivolous and unimportant matter. Much of it is wholly irrelavent and inapplicable to this subject; while plain, practical truths of the highest importance have been overlooked. To expose all their errors and fallacies in detail would be an endless task; I will therefore leave them, and come to known facts and prineiples, and endeavor to show their practical value and applicability to the construction of floors and other structures of like character.

The advantages arising from a combination of cast and wrought iron in beams are greatest in structures of considerable extent; but to show its value in small spans, such as those for which solid wrought iron rolled beams are best adapted, it may be well to show their respective values, cost and adaptation to the requirements of the floor for the drill room referred to.

The room being 35 by 80 feet, having a wall (probably 12 inches thick) extending under the middle of the beam, their clear span will be 17 feet. And, as they require a bearing of six inches at each end, their length will be 18 feet. Placing them four feet apart, the entire floor will require 38 beams; total length, 684 feet. The 9-inch "I" beams, weighing 32 lbs. to the foot, will be 21,888 lbs. total weight. It is usual in such floors to make the brick arches and concrete about 13 inches in depth; as it is important to give to the beams as much vertical depth as the space occupied by the floor will admit of, the depth of the beams should also be 13 inches, instead of 9 inches, as proposed, as, by doing so, the strains in the chords of the beam will, for obvious reasons, be reduced in the same proportion as is 9 to 13. To illustrate this point, allow 75 lbs. to the square foot of surface as the whole weight of the floor, 66 lbs. as load, 34 lbs. to compensate for the effects of vibration= 175 lbs. to the square foot. Multiply this weight by 68, the number of square feet of floor surface due to each beam, and we have 12,900 lbs. for its load (its own weight included). This load on the 9-inch beams will produce strains in the chords equal to 36,550 lbs. And as the section of the chord is equal to 2 square inches, the strain to each inch will be 18,275 lbs. The web connecting the cords is not included in this calculation. Now, suppose this load to be placed on a beam of similar section in all respects, except being 13 inches in depth; then the strains in the chords will be only 25,304 lbs., equal to 12,652 lbs. to the inch. Difference in strain to the inch, 5,623 lbs.; total difference of strain in the chords, 11,246 lbs. Now, add to this great difference in the strains (and the consequent greater strength and stability of the 13-inch beam), the fact that when it is thus made of cast and wrought iron, in the manner and form proposed, with the upper chord curved downward from the middle towards the ends, it will weigh no more and cost no more than 9-inch beams, we have an array of real, obvious and practical advantages in favor of the compound beam that will bear down all the opposing theories advanced on this subject.

But to stop here would not be doing full justice to the questions connected with this floor. It is also necessary to call attention to the consequences that may result from the use of the 9-inch beams in a floor of 4 inches greater depth of brick and concrete, when the use of this floor is to be of an unusual character and peculiarly trying in its nature. The truth is, the 9-inch beams are too flexible for *any* such purpose; but to overcome this obvious defect, their makers recommend that they shall be propped up, and held in a cambered position while the arches are formed between them, and that they be thus held until the brickwork and the concrete are well *set*. This is usually done, and then the floor *seems* to have considerable solidity. But this apparent firmness is undoubtedly deceptive, owing, in part, to the inertia of the great mass of brickwork and concrete. It is also probable that this mass has the effect, to a considerable extent, of sustaining the pressure that ought to act in the upper chords of the beams, and would do so if the beams were as deep as the brick and concrete mass. But as the depth of the 9-inch beams is 4 inches less, they must, for this reason, act mainly as lower chords or ties to this mass. There is, then, this advantage of greater depth to be added to the inertia of the mass in accounting for the greater apparent solidity than is due to such flexible beams alone. This is a question of great importance, and ought to be well understood; for, however well such floors may answer for ordinary purposes, there can be no doubt that the strains and vibrations arising from the regular tramping in a drill room will soon fracture the concrete and shake the stability of the floor. With the other, the compound beam of 13 inches depth, with the strains less than 1-5th of its ultimate capacity, there need be no apprehension; and it will, of course, be understood that the strength of the compound beam may be increased to any extent desired by simply increasing the size or area of cross section. Their length may be made to span 30, 60 or even 100 feet; and, as the length and weight of them is increased, the cost per pound will be less than in light beams. In wrought iron, it is just the reverse of this; the larger cost most per pound. The arched form of the upper part of the combined beams will admit of the introduction of pipes for gas, water or any other purpose, to be imbedded in the concrete in all directions—across the ends of the beams, as well as parallel with and between them.

The object of these remarks is to show the proper application of *both* wrought and cast iron, and not to advocate the exclusive use of either the one or the other; wrought iron for all situations where the forces act tensively, and cast iron in *most* cases where they act compressively. But, notwithstanding the advantages possessed by cast iron to resist pressure, and in its easy molding to the forms required for such purposes, there are some uses of this kind to which it is not practical to apply it; such, for instance, as long and slender rafters, required to sustain light loads, there would necessarily be too slender to bear handling. They must therefore be made of wrought iron. But when the same length of rafters is required to bear heavy loads, and must therefore be made much stouter, then they should be made of cast iron.

B. SEVERSON.

Baltimore, Md., March 29, 1860.

## STEAM PLOWING IN TEXAS.

MESSRS. EDITORS:—None of the readers of the SCIENTIFIC AMERICAN, except those who have seen the Eldorado of the South, can form anything like a correct idea of the natural beauty, charming climate, and great agricultural importance of the State of Texas. I have ust returned from a three months' tour through that country; and, from what I have seen, I am fully convinced that it is the most desirable country on this continent, possessing all the elements necessary to make it a mighty empire. Nature has designed one portion of the great State for the shepherd and the herders of cattle; another for the planter and the tiller of the soil; and still another for the manufacturer of iron. Western Texas is thus pointed out as the proper location for stock-raising, and it is carried on to an astonishing extent. But, owing to the drouths that annually visit that portion of the State, it cannot be said to be at all calculated for planting or farming. Northern or north-eastern Texas abounds with iron ore, which, I am informed, is of the very best quality, and the quantity is inexhaustible. Eastern Texas is most emphatically the place for agricultural purposes; the soil being of the very richest character and the seasons reliable.

While passing through the State I found there was a great degree of interest manifested in the steam plow invented by Col. Saladee, formerly of Columbus, Ohio; so much so, indeed, that I was informed that the State is to make a large donation of lands to the inventor for the successful introduction of his machinery within her territory. While in Galveston, I made the acquaintance of an intelligent gentleman, who gave me a very correct idea of this truly wonderful invention. Col. Saladee has reversed the principle adopted by all other inventors, namely, of contriving a machine which shall be able to propel itself and *drag* the plows; for he makes *the action of his plows to propel the machine*, and thus he overcomes all the difficulties which past experimenters have met with. Another remarkable feature in this invention is that there is no portable steam engine now in use better adapted to all kinds of farm work. And, in addition to this, it possesses the advantages of being readily converted into a ditching machine, which will cut ditches the required width and depth, and distribute the dirt on either or both sides, any required distance from the edge. A reaper and mower, of the most novel construction, is also to be connected, as well as the most simple arrangement for driving posts for the construction of fences on prairies. This, plow, also, is intended to sow the seed, roll and harrow the land at the same time it is plowing. In short, if any premiums are offered on steam plows for the greatest *variety* of work they will perform, Col. Saladee is certainly designed to take the lead.

Col. Saladee's "Pine Island Farm," situated in Jefferson county, on the line of the Texas and New Orleans Railroad, is one of the most beautiful I have seen in the State. Its general appearance to the eye of the traveler passing on the railroad, when compared with those around it, at once leads him to the conclusion that a man of genius and enterprise lives there. The work on the railroad above-named is progressing finely, and I presume by this time two rivers (the Nachez and Trinity) are connected. This road, when completed through to New Orleans, will be one of the greatest thoroughfares in the South.

D. M. RICHINGS.

Merata, Pa., April 2, 1860.

## GLAZIERS' DIAMONDS FOR MILLSTONES.

MESSRS. EDITORS:—Millstones are dressed for the following reasons: to keep their faces, when the flouring is done, perfectly plane and true; to keep the furrows deep enough to ventilate the stones, assist in carrying out the feed and cutting it up in small pieces; and, further, to sharpen the face. To perform this latter operation to the best advantage, we take the red staff with water paint on it, and run it over the face of the stone, which shows the high places and parts of the face, and these only are dressed, which makes them wear down and keep the face true. The usual practice is for the miller to take his picks, with their edges ground perfectly sharp, and dress all the red parts of the face in parallel lines, from 16 to 24 to the inch, leaving the smooth painted face clear and distinct between each line; and the lines are usually cut the same way the furrows are laid out in the stone; some fancy millers putting in 30, 40, or even 50 cracks to the inch, which, of course, makes very fine lines. It was this species of dressing that I talked about doing with a glazier's diamond; and I tell you it has been done.

J. G.

Patriot, Ind., April 2, 1860.

## HEAT IN PHOTOGRAPHY.

MESSRS. EDITORS:—A few days ago, while experimenting with some photographic positive prints on paper prepared with ammonia-nitrate of silver, which had been fixed with hyposulphite of soda but not toned, I found, on pressing them with a hot iron, they re-assumed their purple or black tones according to the degree of intensity to which they had been pressed. Has this effect of heat been known before or is it new? I have not seen any account of this method of toning prints in any work on photography that I have read. By explaining the cause of this you will greatly oblige—

W. J. T.

New York, April 9, 1860.

## CAN WE SEE OUR OWN EYES?

Yes; for sight is effected by means of the rays of light that proceed from the visible object to the eye. In every instance the rays are turned, more or less, from their course. Whether this deflection be caused by refraction or reflection is immaterial; if the visual ray reaches the eye, the object is seen. We speak, indeed, of seeing an image in a mirror, but the image has no actual existence except in the mind. The mirror merely turns back the rays of light so that they reach the eye, and thus enables us to as truly see the object itself as when we look directly at the object through the air, glass, or other refracting medium.

C.

LOBSTER FISHING.—The season for taking these crustacea (says the New Bedford *Mercury*) has just begun, and will continue till July. In the cold weather they strike off into deep water, where it is probably warmer than near the shore. As the warm weather approaches they leave their deep-sea retreats, and coming near the land, immense quantities are caught in traps made for the purpose, with a self-acting door, which opens as they pass through and immediately closes, leaving the lobsters in "durance vile." Lobsters are caught on the coast of North America, from the St. Lawrence river to the Gulf of Mexico. They have been known to live without any sustenance, after being caught, for six months. It is estimated that not less than 1,200,000 lobsters are carried into Boston during each season. They are sent from that place, boiled, to every part of the State.

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## THE LONDON FIRE-ESCAPE.

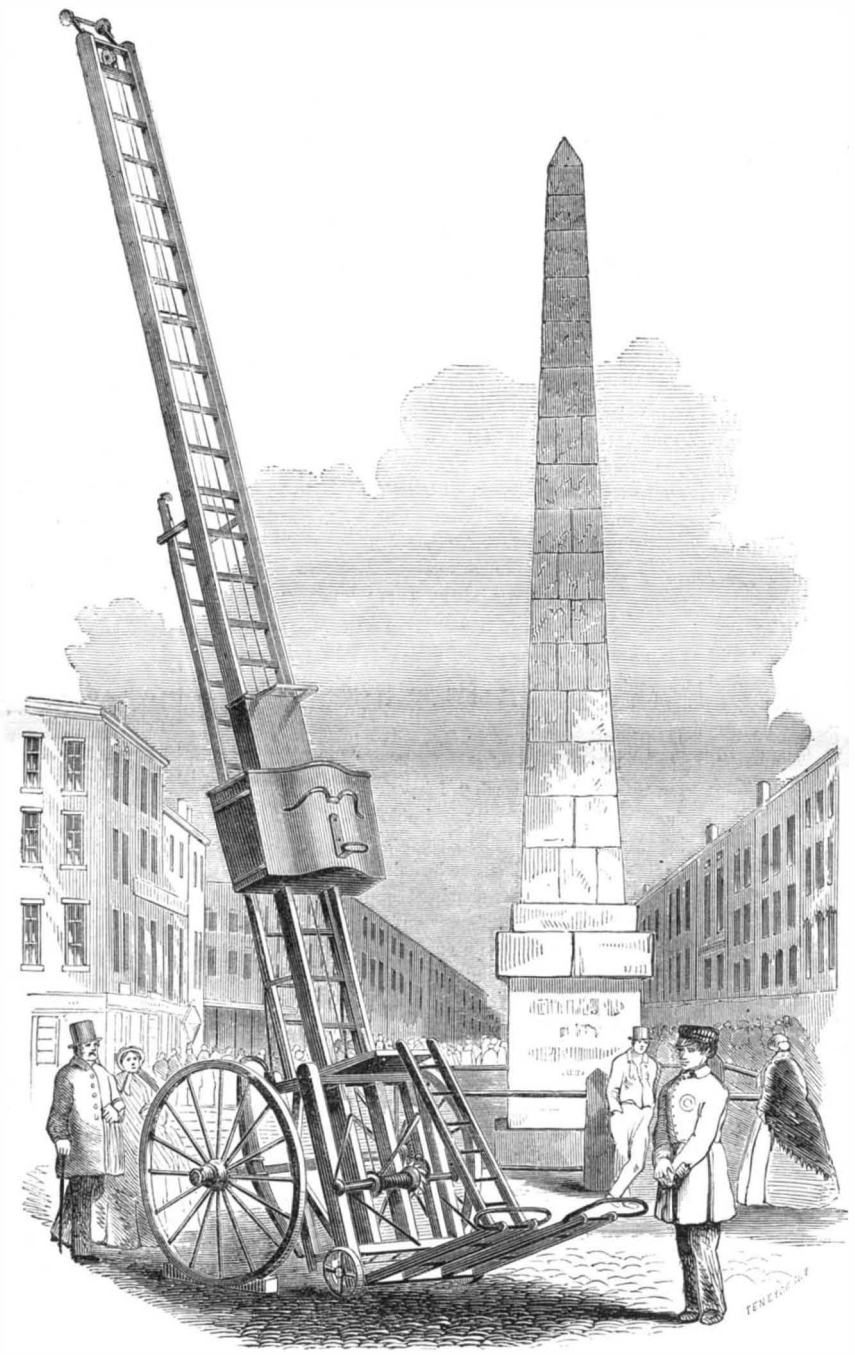
The frequency of fires in the city of London, and the appalling calamities by which many of them were attended, lead, in 1833, to the formation of a society called "The Royal Society for the Protection of Life from Fire," the object of which was to save persons from the horrible fate of being burned alive. The first means adopted were the printing and circulating of an immense number of little pamphlets, containing minute directions to persons who might ever chance to find themselves in burning buildings, in regard to the proper mode of proceeding, such as crawling on their knees to avoid the smoke which fills the upper part of a room, covering the face with a wet cloth, &c. They also offered rewards to all persons who might be instrumental in saving the life of any one exposed to danger from fire. The inventive genius of the community was aroused and the company had innumerable plans for fire-escapes submitted to their examination. They tried several, and finally adopted the one represented in the annexed engraving.

This is an extension ladder, so light that it is readily transported and managed by one man; it being trundled through the streets in the erect position shown. The main ladder is designed for the windows of the third story; and there is a supplementary ladder for either the second or the fourth story, as occasion may require. A light box or "balcony," as it is called, is fitted to slide up and down the ladder, for the removal of children or persons too timid to descend on the rounds of the ladder by themselves.

The funds of the society are contributed by voluntary subscription, partly by individuals and partly by insurance companies. A man is constantly employed to be always ready at each ladder; and he is required to proceed on the first alarm to every fire in his district, where it is his duty to devote himself to the saving of life. These ladders are stationed within half a mile of each other all over the city; they cost about $600 each, and it requires about $400 per year to keep one in order and pay the wages of the attendant. The society at this time numbers 15,000 subscribers, and they maintain 70 fire-escapes.

In looking over the record for the last 20 years of patents which have been taken out for fire-escapes, we find that they are all comprised in four classes—extension ladders, canvas tubes, lazy tongs and friction ropes. On June 27, 1846, James Cox, of Brush Valley, Pa., took out a patent for an extension ladder, which is essentially the same as that of the London apparatus, which was invented and constructed in England in August, 1848. On the 20th of February, 1847, Wm. Van Loan patented a fire-escape, consisting of a canvas tube for people to slide through, with proper hooks for attaching it to windows. We have been informed that this invention has been tried in England. We called attention to it on page 56, Vol. III. (old series) of the SCIENTIFIC AMERICAN. On June 2, 1851, John C. F. Salomon patented a ladder with folding steps, of a very novel character. A patent for an extension ladder was secured by George W. Keller on April 18, 1854; and another by Thos. Armitage, of the same date. Since that date the inventions have been multiplying; and there never has been so great activity in this department as at the present time. Inventors see plainly that the humanity of the country will imperatively demand an ample provision of fire-escapes, and that he who happens to think of the very best contrivance will find a large market for his ideas.

There are probably more than a score of applications now pending before the Patent Office on fire-escapes—nearly that number having been applied for recently through the Scientific American Patent Agency; and at a proper time illustrations and descriptions of some of them will appear in our columns.



THE LONDON FIRE-ESCAPE.

## NEW JERSEY COPPER.

In passing through the eastern portion of New Jersey, near the Passaic river, the traveler is surprised to witness a soil possessed of a deep color, resembling, in a measure, good brick-dust. This color is due to the presence of a valuable and useful metal (copper), which is very plentifully distributed in some situations, and which is found in sufficient abundance in some localities to yield good returns by smelting. If we mistake not, the first copper mines worked in this country were near Belleville, in New Jersey. This was before the Revolution, and Hornblower—brother of the celebrated English engineer of that name—came out with the first steam engine to operate the machinery. These mines ultimately ceased working, owing to a decrease in the richness of the ore; but they were re-opened last year, by an association named the "New Jersey Copper Company." Their property is near Belleville, embracing a tract of 59 acres in a bold ridge, in which are a great number of old pits which indicate the former ancient workings. Proper machinery and buildings have been erected to carry on the operations; four of the old pits have been opened, and have been operated thus far with considerable success. Originally, these old mines were only to a depth of about six feet—no better than rabbit burrowing—but the present shafts have been sunk to about 100 feet. They pass through strata of alluvial soil and red sandstone 15 feet in thickness; then through a thick seam of red slate, beneath which is the bed of copper ore and sandstone. The ore is a carbonate of copper; and is said to be perfectly free from arsenic. The best quality of the ore is worth $190, which is sold to a smelting company that has its works situated at Bergen Point. The amount of metal in the ore is about 25 per cent. It is transported in bags, each weighing about 15 pounds; and 700 sacks are now raised monthly, and prepared at the mines, by stamping and washing, for smelting.

## THE DICTIONARY CONTROVERSY.

Considerable interest has been manifested among philologists in reference to the comparative merits of the rival dictionaries of Webster and Worcester; the work of the latter has recently appeared. We accepted Webster as the standard dictionary of our language some years ago; and, although we would not deny the excellencies of Worcester, still we adhere to Webster, and shall continue it as our authority.

The Springfield (Mass.) *Republican* says that Professor Stowe, of Andover, states of the new dictionaries as follows:—"I have looked over, with some care, the last issues of both Webster's and Worcester's dictionaries. Without any disparagement of Dr. Worcester as an able, laborious and successful lexicographer, I must say that this examination has confirmed my former impression of the superiority of Webster on almost every point for which a dictionary is usually consulted. Webster's dictionary, as now published, I think, has decidedly the advantage over Worcester's in the analytic clearness, the accuracy and neatness of its definitions, in the nice philosophical discriminations of synonyms, and in the graphic significance and beauty of the pictorial illustrations. It seems to me that all these qualities are clearly obvious, even to the most hasty examination. In the orthography of the comparatively few words in regard to which they differ, I generally prefer Webster, as he follows more closely the analogies of the language, anticipating usage, which is every day gaining ground, rather than adhering to that which is passing away. In copiousness of vocabulary, they appear to me to be about equal; at least, no one can *now* pretend that the vocabulary of Worcester is more *select* and *pure* than that of Webster."

## THE DISHONESTY OF ENGLISH TRADERS AND MANUFACTURERS.

On the 18th of January last, a meeting was held at the Chamber of Commerce, in the important town of Huddersfield (England), when the subject discussed was the practice prevailing in many of the largest firms in England of falsely marking or labeling goods for sale, with a view of preventing the dishonest practice. Mr. Charles Brook, one of the partners in a manufacturing firm in Huddersfield, read a long statement, detailing the nature and extent of the practice under discussion, and made some significant revelations. We briefly give some of the facts related by Mr. Brook.

For many years his firm was manufacturing sewing

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cotton in the bundle, but more recently commenced winding cotton on reels. In the course of their business a shipping merchant from Manchester asked them to supply a large quantity of cotton. In the course of the negociation Mr. Brook was asked the price of 100, 200 and 300 yards. The merchant objected to the price named as being too high, adding, "for 100 yards you must give us 70, for 200 yards, 150, and for 300 yards 230." Mr Brook could not understand it, and asked if they wanted to make his firm into a pack of rogues? The merchant said "there was no roguishness in it—it was the custom of trade," and closing with the remark that "unless the Messrs. Brook did it, they would never get on." Mr. Brook then went to Manchester to make inquiries, and did not find a house there, but what was carrying on the system; indeed it was carried on by men of the highest standing in the city.

In one shop in London the master told him he could not guarantee an honest article, and taking up a pocket handkerchief, as an example, which ought to have been square, it was found to be two inches narrower one way than the other. A roll of silk invoiced as 18 yards, was found to be not more than 17 yards. It was the same with cotton cloth

One feature in this practice is that it entails very great hardship on the retailer. He must measure over each article, for, if he take for granted that the length is correct and deal out to his customer honest measure, the draper will find that he is selling at a loss rather than a profit, from the goods being short-lengthed. Braids were sold in lengths of professedly eight yards, yet few would be found more than seven yards and a half. Ribbons were sold by the piece and marked 18 yards, yet 17½ yards was deemed good measure. Damask table cloths were sold as 12-4. They should be three yards long, but in that instance the quarter of a yard was only seven and a half inches instead of nine.

The question is now occupying public attention, and an association has been established to suppress such dishonesty.

## THE LARGEST VACUUM PAN IN THE WORLD.

Thomas Harrison, of No 260 West-street, this city, has just completed for a sugar refinery in Bristol, R. I., a vacuum pan which he says is the largest one in the world. It is nearly globular, being 10 feet, by 10 feet 4 inches in diameter, made wholly of copper 5-16 of an inch in thickness, standing in a cast iron jacket at the bottom, weighs 6½ tuns, and is worth over $7,000. It will evaporate the water from 25,000 lbs. of sugar in 2½ hours, that is about 50 tuns per day.

In refining sugar, the brown material is dissolved and brought in contact with the purifying matters in a state of solution, after which the water in which it is dissolved must be removed by evaporation, and the sugar again granulated. In order that the evaporation may take place at a lower temperature than that at which water will boil under the pressure of the atmosphere, those tight and strong vessels called vacuum pans are used. The vapor as it rises is condensed by a jet of cold water, and the water is drawn away by pumps, by which means the pressure on the surface of the liquid is reduced, and boiling or evaporation goes on at a lower temperature. In the vacuum pans of sugar refiners this temperature ranges from 140° to 170°, instead of 212°, the boiling point in the open air. The heat is supplied by a coil of steam pipes in the bottom of the pan, and a small circular plate of glass is inserted in the pan near the top to enable the workman to watch the operation.

Mr. Harrison says that 14 years ago, when he commenced the manufacture, all the vacuum pans were imported from abroad, mostly from England and Belgium, but that now the importation has almost wholly ceased, excepting those which pass through this port on the way to Cuba.

## THE CALIFORNIA PHILOSOPHER AND HIS STEEL BILLIARD BALL.

In the town of Sonora, California (according to the San Jose *Reporter*), resides a venerable philosopher, named Dr. ———. Although he is now about 70 years of age, yet he retains his faculties in full force and vigor, and is as buoyant as a man of 40 years. For 30 years the doctor practiced physic and surgery in Louisiana. But having the misfortune to lose every member of his family by sickness, thus being left to pass the remnant of his days in loneliness and sorrow, he concluded to quit his practice and repair to the golden shores of the Pacific. He arrived in California shortly after the first gold excitement, since which time he has devoted his attention to scientific research and philosophical reflection. His unaided labors have resulted in the collection of the very finest cabinet of minerals, geological specimens and antiquarian curiosities to be found on this coast. In addition to this, he has gathered up a very creditable library of well selected volumes, all of which the citizens are permitted to read, free of charge. In fact this extraordinary man is building-up what he calls a "scientific institute," for the sole benefit of the community in which he resides. As he has good health and a competency, is temperate, and lives alone or nearly so, his expenses are very light, and even this he manages to defray by his skill in mechanism. He is not only a ripe scholar, a practical chemist, botanist, mineralogist, geologist, and a proficient in almost every other branch of science, but he is a finished mechanic. He manufactures guns, clocks, watches, steam engines, edge tools and a variety of other things. Recently the doctor has been engaged in inventing a machine for the purpose of making billiard balls of cast steel. The balls are to be hollow spheres, and are about the size of the common ivory balls now in use. The balls are first made and nicely turned into the shape of half spheres, and are then soldered or brazed together with gold. The doctor claims for his invention that he can give steel a greater elasticity than ivory has; that a more perfect sphere can be made of it; and, above all, that it is a much cheaper material. The machine for turning and fitting the balls is a most ingenious contrivance.

## THE VALUE AND USEFULNESS OF RAILROADS.

Mr. Milner, in his late report survey, exemplifies the value and usefulness of railroads as follows:—

"In 1837, I was engaged on the Georgia State Railroad, just then commenced. I there became acquainted with the people along the road, their habits and their means. Beyond their actual wants of food, they raised nothing at all. The men moped around, and shot at a mark. The women seemed to do but little, whilst their children, poorly cared for, sauntered about from place to place, as if their largest thoughts were bent on catching rabbits, opussum, or some such small game. What was the use of working, when it would cost them two dollars per bushel to get their wheat to market, and then get only one?

"In 1857, I went back again, and what a change! The rivers were the same—the Kenesaw Mountain had not changed—the 'Crooked Spoon' still rolled along—the men and women that once I knew were there—the boys had grown to men, and the girls to women; but their mien was changed. The old men stood erect, as with conscious pride they looked upon the waving fields of grain. The matrons busied themselves about their dairies and their looms; whilst the sturdy boys were grappling with the plow.

"What had brought this change about? Listen for a while, and soon you will hear the iron horse come snorting along. He stops at a station for fuel and water—a man gets off the train. He is a Charleston man, or perhaps the agent of the Montgomery Mills. The cars go on, and he goes to the house. He meets the farmer—they have met before. His business is to buy his grain. Strange, but true, that the demand for wheat should be so great as to induce the merchant to buy at the farmer's door. He offers one dollar and a half per bushel, cash, for the entire crop and furnish the sacks to put it in. That won't do. Savannah was here yesterday, and Columbus the day before, and they offered more. Here is the key to this great mystery. The great State road—the iron horse—the dollar and a half per bushel, cash, tells the tale. This is literally true, as any one can ascertain, by inquiring of the man that knows."

## ETCHING ON STEEL.

Messrs. Editors:—I now send you a process of engraving on steel, which I have worked with success: Dissolve one quarter of an ounce of corrosive sublimate and the same of alum, both powdered finely, in half a pint of hot water, strengthened with a little nitric acid. When cold, pour it on your plate and keep stirring it with a camel's hair pencil; rinse the plate after every biting. Delicate tints are obtained in two or three minutes, stronger ones in proportion. L. W. A.

## SNAKES.

Messrs. Editors:—In your "Column of Varieties," in the Scientific American of the 17th inst., it is said that "one of the large anacondas in Barnum's American Museum has recently been delivered of a litter of young," and it is added that "snakes are ova-viviperous, that is to say, eggs are formed and hatched in the body of the animal. This has probably given rise to the popular notion that these reptiles swallow their offspring." Will you or some of your correspondents inform us which snakes *are* ova-viviperous, and which are *not?* For ourselves, we have had reliable testimony and occular proof that *some* snakes do lay eggs. In New England, we have repeatedly seen the eggs and crushed them, and found young snakes in them. A friend at my elbow, who was, some three years ago, a clergyman, in Franklin county, Mass., found a large number of them under a flat stone, ; they were not shaped like birds' eggs, but were nearly flat at one end and were as hard as baked pipe-clay. The eggs were brought to the house and each egg contained a live snake, between two and three inches long. The only kind of snake that we ever saw in that part of Massachusetts was the checkered snake. In Taunton, Mass., we once saw, in company with others, a large blacksnake, stretched the entire length across a cart path in a lane, sunning itself and family of little snakes, and were surprised that instead of fleeing from our presence, the mother opened her mouth and the young snakes all ran down her throat. One of our number broke a long withy stick, from a bush at hand, and killed the old snake, which seemed incapable of moving with her burden. A gentleman who was visiting us, from the city (since dead), opened the snake and killed about thirty of the little snakes; they were about a quarter of a yard long, and seemed, judging from their activity, abundantly able to take care of themselves. A few made their escape in spite of all efforts to the contrary.

Mr. O. M. Bullock, of this place, tells me that he has repeatedly found snakes' eggs, and seen little snakes run down the old snake's throat. The old snake is seldom found near the eggs; they are apparently abandoned to be hatched by the warmth of the sun, though it is probable that she is watching, somewhere in the vicinity.

We send you this as a proof that there *is* some foundation for the popular notion that snakes swallow their young, when danger is near; just as the hen calls her's under her wing, the snake bids her's run down her throat.

M. C. T.

Tonica, Ill., March 26, 1860.

## AN INVENTOR SENSITIVE ABOUT HIS NAME.

Messrs. Munn & Co.—In publishing the claim of my Hand Corn Planter, in the Scientific American of March 17th, you misspelt my given name. I am receiving communications every mail, and it makes it inconvenient. You have printed my name "Herman," it ought to be "Heman," minus the *r*; if you see fit to make a correction, it will be thankfully accepted by your client. The patent referred to was got through "my agency," and believe me that the expense that I had with it was a valuable lesson. I was over four months getting the case through; it was once rejected, as is the case now in your charge; had I employed you in both cases it would have been greatly to my interest. I shall not solicit Letters Patent through "my agency" after this, but confide them to the care of Munn & Co.

H. B. H

Bristolville, Ohio, April 2, 1860.

Preserve your Numbers.—We believe most of the subscribers to the Scientific American do keep the numbers and have them bound; but, occasionally, we hear old subscribers complaining at their short-sightedness in not having preserved their numbers and having had them bound. Some of the back volumes of the Scientific American can be sold for $10 each. Eight or ten years hence we would not be surprised if *this* year's volume will be worth as much; so preserve your numbers, reader, and have them bound. You will regret it if you do not.

The Leipsic Common Council has, under heavy penalties, interdicted the sale of cotton goods for ball dresses of a green color, on account of their being dyed with Schveenfurt's green, which is arsenate of copper, and a deadly poison.

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## AN IMPROVEMENT IN PAPER MANUFACTURE.

[Translated expressly for the Scientific American.]

Paper manufacturers and printers often find that engine-made paper, which was delivered perfectly white, turns yellow in a short time. Sometimes the yellow tint is not spread all over, but appears in spots, more or less extended, and of a color similar to iron rust. Some manufacturers have applied to us for means to prevent this defect, and we began our experiments with paper from the manufactory of Essonne, and other kinds received from Mr. Firmin Didot, and finally extended them over numerous kinds of paper made in the trade. We soon found that these spots, or the general yellow tint, were produced by oxyd of iron; alkaline substances do not remove them, while acids make them disappear rapidly. A sheet of paper which we tested was spread upon a pane of glass and equally wetted with water slightly acidulated with muriatic acid; then small pieces of paper which were previously found pure, imbued with different tests for iron, were pressed upon it, and we had all the reactions which are obtained by tannin, prussiate of potash, &c, in a greater or less degree, as the paper tested was of a more or less yellow tint. No doubt could remain as to the cause; but we had now to ascertain the process by which the iron came into the paper, and in what shape it was introduced. It is evident that the chemical and mechanical operations, to which the paper pulp is subjected, are more likely to withdraw any iron it may contain from the pulp than to give iron to it, and we were convinced beforehand that we would find no iron, or perhaps only slight traces, in the fully prepared pulp. Such was the result. We incinerated a certain quantity of paper and an equal quantity of the pulp from which it was made, and found in the latter a much less proportion of iron than in the paper. Some pulp which had been very carefully prepared was entirely free from iron. Hence it was certain that the iron which we found in the paper was introduced after the washing of the pulp, in the spreading and drying machinery; and to this part of the process we directed our attention. By the washing in the beating engine, the pulp is divided and freed from the chlorine with which it is impregnated, and the longer the washing is continued the better, and much depends on the distribution and arrangement of the blades in the engine. A perfect washing is almost impossible, and therefore paper is often found which contains so much chlorine that its smell is yet plainly observable, and this chlorine will soon destroy the strength of the fiber. From the engines the pulp is carried into the spreading machinery, where it is spread out, condensed, dried and wound up. A pulp perfectly washed would not undergo any change in these operations, because neither the steam nor the water which acts upon it can form a soluble substance from the materials of which the machinery is made, that could penetrate the paper. But this is never the case in many mills, and pulp is often worked which is not free from chlorine. Although much of it is pressed out with the water, yet some remains (as it combines most intimately with the fiber), and attacks the iron rolls, forming protochloride of iron which penetrates the felts and paper. The impregnation of the felts is evident. They nearly all have rust spots on them and turn yellow very soon; this is the effect of the soluble protochloride of iron which, on exposure to the air, changes to perchloride, and finally to oxyd of iron, which causes the rusty appearance of the felts. The protochloride of iron is not visible in the paper immediately after it is finished, being colorless, and as long as it remains dry and packed close no change appears; but the slightest dampness and exposure to the air causes the protochloride to pass into the perchloride of iron, and the oxyd becomes visible. This explains the observation which was made to us by a printer, that the yellow spots often appeared when the paper was damped for printing. The origin of these yellow spots being thus ascertained, we turned our attention to the means of correcting or preventing their occurrence. By simply washing the pulp the chlorine cannot be removed unless, perhaps, with a great expenditure of time and water, because the chlorine combines actually with organic matter. If you have put your hands in a solution of chloride of lime or soda, washing will not at once remove a certain roughness of the epidermis, nor the smell of chlorine. The means to be employed must, therefore, be of a chemical character. They commonly consist in materials which, mixed with the paper pulp, can combine with chlorine into soluble substances. These re-agents are commonly called "antichlorine," and deserve the greatest attention, as by their application the loss of time which a long washing requires is saved, and the product protected against such changes as lessen its value and cause even its total destruction. They are not exclusively useful in paper-making, but they should be employed in all branches of manufacturing where chlorine salts are the agents for bleaching. It is a fact known to every one that unbleached cotton cloth is stronger than bleached, and that bleached goods are often strongly tainted with a smell of chlorine; when such goods are destined for dyeing or printing, the colors are frequently sensibly affected by it. When housekeeping linen is bleached with chloride of soda, any trace of it left remaining in the cloths has, in time, a very detrimental effect, and it would be very desirable that the antichlorine should be made use of in all such cases. There are many chemical bodies which can neutralize chlorine. But it is not indifferent which one is made of, because it must satisfy several conditions; it must not leave a residuum in the material, its application must not have any other dangerous effect, and it must not be expensive. As far as we know, it was Mr. Barresvil who first occupied himself in applying such neutralizing materials, and he recommended the sulphite of soda. Afterwards, some one in Amiens proposed the hyposulphite of soda, at a time when it was yet very expensive; and Messrs. Bobierre & Moride (at Nantes) proposed the protochloride of tin.

We will now compare the above three re-agents in respect to their price and efficacy. 1 equivalent of sulphite of soda (NaO, $SO^2$+7HO) neutralizes 1 equivalent of chlorine, forming hydrochloric acid and sulphate of soda, which go off with the water. The protochloride of tin (Cl Sn 2HO) neutralizes also 1 equivalent of chlorine, and passes into perchloride, which is also soluble. The hyposulphite of soda (NaO, $SO^2$+5HO) neutralizes a much greater quantity of chlorine. We have ascertained that it neutralizes four equivalents and forms sulphate of soda, sulphuric acid and hydrochloric acid. By calculation it stands thus:—1 kilogramme (2 lbs) sulphite of soda absorbs 281.44 grammes of chlorine; 1 kilogramme protochloride of tin, 315.77 grammes of chlorine; 1 kilogramme hyposulphite of soda, 1,143.98 grammes of chlorine. This shows that the latter salt is 3½ times as effective as protochloride of tin, and nearly 5 times as effective as the sulphite of soda.

The present cost of the above substances (for 100 kilogrammes), is as follows:—Sulphite of soda, 125 francs; hyposulphite of soda, 125 francs; protochloride of tin, 150 to 300 francs.

To neutralize 1 kilogramme or 409.83 litres of chlorine there must be used:—3,116 grammes of protochloride of tin, costing 7 to 8 francs; 3,553 grammes sulphite of soda, costing 4.44 francs; 874 grammes hyposulphite of soda, costing 1.09 francs.

The hyposulphite of soda is, therefore, by far the cheapest, and by its application the washing of the pulp can be so accelerated and made perfect the balance is greatly in its favor. We have now to state in what manner it is applied, and its efficacy tested. The latter is done by means of a liquid test thus composed:—Starch, 10 grammes (⅓ oz.); iodide of potassium, 10 grammes; water, 500 grammes (1 pint). The starch is boiled to a thin, clear liquid with the water, and the iodide of potassium is added. This liquid does not remain good for more than 6 or 7 days, and we must not make too much of it. When any substance having free chlorine is brought into contact with this liquid, a blue, purple or brown color appears. The chlorine decomposes the iodide: the iodine is set free and combines with the starch as blue iodide of amylon. After the larger portion of chlorine has been removed by washing, a solution of the hyposulphite of soda is added, in small portions, and the material (pulp, cloth, yarn, &c.), tested with the above. When no blue color appears the chlorine is all removed, and a little longer washing will finish the work. A small quantity of clear solution of soda, thrown lastly into the water, to neutralize the acids formed by the effect of the antichlorine, is also very advisable.—*Journal de Pharmacie et Chimie.*

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THE Texas papers are filled with accounts of the depredations of the Indians, and of the fights between them and the whites. It is said that the Indians were never so troublesome as they are at the present time.

## "WANTED—A COTTON GIN!"

MESSRS. EDITORS:—Having devoted much time and money to the subject of ginning cotton, and taken out several patents in this department through your agency, I have read, naturally with interest, the letter in your last issue (page 212), signed A. J. H.

With your permission, and for the purpose of further ventilating this subject, I would say to your correspondent that, while it is by no means an easy task to gin cotton (even upland cotton) perfectly and *rapidly*, yet the great error in the plan projected by Mr. Whitney, and which has been followed up by cotton gin builders and caused most of the trouble in the after processes of manufacture ever since, may easily be found in his idea of forcing the staple *through a stationary breastwork of iron at the point where the seeds are arrested and abruptly stripped.* Until this mistake is set right we shall never have a pound of cotton properly ginned. However paradoxical it may seem, there is a great difference between stripping the cotton from the seeds, or the seeds from the cotton. If the planters of upland cotton really desire a better gin (which they certainly need), and if they are willing to pay for it, they can have a gin to handle more cotton per day, leaving the staple faultless in preparation, and with less outlay of power, than any of the gins in use. But unless an engineer has more than money enough to live without troubling himself about anybody's wants, he can easily spend *all* in battling the ignorance and prejudice of the planters or their overseers who use these gins.

Let the planters in any State or part of a State, just put up, say $5,000, as the first installment of the "everlasting fortune and eternal income" referred to, to be paid for a gin which shall accomplish a certain specified amount of work, properly done, leaving the decision to proper judges, and there will be no trouble about cotton gins after that. The work can be done, and the machine already patented, but I am not alone in feeling that it is a thankless task for any one to spend time and money to supersede the present imperfect gin, for any section, unless the planters in that section are *pecuniarily* identified with such efforts.

If your friends are in earnest, let them put up the money in any fair way, and there will be plenty to enter the lists to compete for something *tangible.*

LEWIS S. CHICHESTER.

85 Maiden-lane, New York, April 2, 1860.

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## TRIAL OF LOCOMOTIVES IN SOUTH AMERICA.

MESSRS. EDITORS:—Yours, asking for information in regard to the trial of strength of speed of the English and American locomotives on the Southern Railroad of Chili, South America, is at hand; and I will in reply give you such information as I am able. I had, when I left Chili, the data of the respective weight, power, &c., of the different locomotives; but it has got mislaid somewhere. There has been, for a long time, a rivalry existing between the English and American residents in Chili, in reference to the manufactures and machines of the two nations—each claiming a superiority over the other; and there being a good chance to test this question by the fact of having two American and two English locomotives on the same road, it was finally decided that a trial should take place, and be considered conclusive and decisive. Mr. Evans, the American engineer-in-chief of the Southern Railroad, and Mr. Bayles, the superintendent (English) of the works on the Valparaiso and Quilota Railroad, were the judges. The first locomotive tried was the *San Bernado* (American freight engine); she left the station with 35 cars loaded each with 25 bars of railroad iron (21-feet bars), and arrived at San Bernado in 35 minutes, the distance is 12½ miles. The second locomotive was the *Varras* (English freight engine); she left the station with the same number of cars as the previous engine, and in ascending a slight grade, about four miles distant from the station, she got stuck, and came back. The third locomotive was the *Santiago* (American passenger engine); she left the station with 10 cars loaded with railroad iron as above, and five passenger cars, and arrived at the Maipo Bridge in 35 minutes; the distance is 17½ miles. The fourth and last locomotive was the *Moritt* (English passenger engine); she took the same train from the station as the *Santiago*, and arrived at Maipo in 51 minutes; thus ending the trial, which was pronounced by everybody who witnessed it—English, Americans and others—to be fairly won by the American locomotives.

C. F. PEARCE.

Providence, R. I., March 30, 1860.

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## POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, the 29th ult., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the president, C. Mason, in the chair.

### MISCELLANEOUS BUSINESS.

*Water Filter.*—Mr. Isaac W. Merchant, of Boston, exhibited a water filter to be attached to stop-cocks, manufactured by Baxter & Bro., of that city. The filter consists of a thin corrugated band of brass, closely coiled like a watch spring, and fitted into a ring. The ring is inclosed in a hollow sphere, pierced at its poles by short tubes, which serve for the attachment to the stop-cock and the passage of the water. The ring plays water-tight in the sphere, and there is a lever attached to one side of the ring by which it may be turned over, and thus cleaned when it becomes foul. Messrs. Haskell and Garvey were appointed to report on the merits of this filter.

*Johnson's Gas Burner.*—Mr. A. L. Bogart, by means of various interesting experiments, making use of the photometer, demonstrated the alleged advantages of Johnson's gas regulator and burner. The interior of this burner is provided with one or more metallic cones against which the current of gas impinges, re-acts, and loses its force, so that it issues at the orifice quite stagnant. The result is, that the gas burns slower and gives more light. Mr. Bogart thinks that the light of gas comes from the burning of carbon, and that, with the ordinary burner, much of the carbon is unconsumed, and passes away as invisible gas.

Mr. Seely—The light of gas is dependent upon the carbon, but not directly by virtue of its burning; in the act of burning, it gives little light. In burning, gas is decomposed, the hydrogen is first burned and heats the free particles of carbon white hot; the particles of carbon give light precisely as a hot wire does. The problem of greatest illumination requires that the particles of white hot carbon be suspended as long as possible without burning them. From the ordinary burner, the gas issues with force, mingles quickly with the air, and the carbon is burned before it can give out light; it acts like a blow-pipe. Gas flame gives most light when it is tinged with yellow, but is more intense when it is white. Professor Hendricks and Messrs. Seely and Garvey were appointed to report on the merits of this burner.

*Friction Rollers.*—Mr. W. J. Demorest exhibited Pratt's improved friction rollers. The journal is surrounded and bears on six or more rollers placed at equal distances and on fixed axes. But the rollers are hollow, and inclose other six or more small rollers systematically placed, with axis attached to them, and traveling around the axis of the larger roller. A large fly wheel, arranged with such a system, was set in motion, and kept revolving about two minutes. Mr. Demorest was willing and able to answer all objections. Messrs. Dibben and Serrell were appointed to report on the merits of this invention.

The President here announced the regular subject—"Modes of Conveyance to and from New York."

### DISCUSSION.

Professor Mason read an able paper on the economic and general bearing of the whole subject.

Mr. Howe—Steam must take the place of horses on our inland canals; and it seems generally to be admitted that we must look for some change in the construction of boats and adoption of the best form of the propeller. The propellers especially designed for canals are Cathcarts's, which is set on a universal joint, so that it may be used for steering, as well as propulsion; and an invention of two propellers inclined towards each other, to confine the disturbance of water to the center of the canal, and to give facility of steering. We may even expect that side wheels everywhere will be superseded by screws. The machinery of side-wheel steamers occupies one-third of the best room in the boat; the machinery is also heavier than that of a propeller, and consequently takes more force to move it. The side-wheel boat draws more water; at a depth of 16 feet, the pressure is 1,000 lbs., while on the surface it is only 62 lbs. The steamer *Baltic* (on Lake Erie) exchanged side wheels for a propeller, and she now makes profitable trips with less fuel than before. Experiments with propellers have failed only from faulty construction.

Dr. Van Der Weyde—Screw propellers are best for the ocean, for they are good sailing vessels as well as steamers. Wheels and wheel-houses are very serious obstructions in sailing against the wind.

The President—The line of propellers between Hartford and Albany competes successfully with sailing vessels.

Mr. Garvey alluded to Montgomery's invention—the enclosing of a screw in a cylinder as a preventive of the washing of the banks of a canal. This cylinder will not injure the bank if it strikes, and will protect the screw. He said that Mr. Howe was in error in the assertion that the increase of pressure of water by its depth has anything to do with the power required to propel a boat.

Mr. Howe—A body moving on water displaces what is in front and what is below. If a body is sunk, it also must displace what is above.

Mr. Fisher—Is not our question conveyances in the city? that is the subject we discussed last week. The morning papers announce "City Railroads."

The president read the question as adopted.

Mr. Fisher—I perceive now how we are all *at sea.* [Laughter.]

The president said that, last summer, two side-wheel boats made regular daily trips of 30 miles to and from Syracuse.

Mr. Dibben—There have been successful steamers on the Delaware and Raritan Canal for six or eight years. The boats are able to compete with anything. At a speed of 8 or 10 miles an hour, and with 6 to 8 tuns of coal for the trip, they carry 300 tuns of freight. To carry the same freight by railroad would cost about 50 per cent more; but railroad managers are generally willing to carry for less cost if they defeat others. I believe that freight is generally carried cheaper on water than on land. The Hudson River Railroad cannot honestly take the freight from the boats which ply between New York and Albany.

The president could not agree with the last speaker. The directors of railroads are men who are the chief owners, and they conduct the business of the road as they would their own private affairs; and no man, in his business, persists in a course which he knows is ruinous. A deputation from the Central Railroad went to Albany to ask (for the road) the privilege of carrying cattle without toll. The Legislature objected, but the deputation persisted before a committee, who believed that railroads could not carry cattle with honest profit. The chairman of the committee finally, feeling worried out, said, with more emphasis than eloquence, "Let the d——d fools have their way!" Now, the men who would think of transporting cattle in any other way from Buffalo to Albany are surely the fools. The Hudson River road offered to bring cattle from Albany for the cost of the extra fodder and the changing from the boats. They found the business profitable at this rate when they had enough of it. Now they carry all the cattle. The saving by the use of coal on the Hudson River road is equivalent to a rise of two per cent on its stock. The road cost $14,000,000; and of this, $11,000,000 are as good to-day as when it was built. Only $3,000,000 is liable to injury from any amount of business. Give a road as much as it can do, and we shall know how cheap its rates for freights or passengers may be. One train can carry more than any steamer. China is a prosperous agricultural country by reason of its canals, but Illinois is more so from its railroads. The Illinois farmer is in New York every day. Even in Iowa, the people daily consult the New York market. In a few years the receipts at the station of Poughkeepsie (where I reside) have risen from $60,000 to $120,000 per annum. The Central road is capable of doing more work than canal and road together have done. [Applause.]

Mr. Godwin—What do you think of *Pro Rata?*

The President—I think it a silly meddling of the Legislature with business which should not concern them.

Mr. Howe—The improvements in railroad business is in the direction of light engines and the proper use of coal.

Professor Hendricks—Further elementary and mathematical study of the propeller is required. The screw now stirs up the water too much; it wastes its force in this way. Let the motion be quick, and in the right direction. The force required to move a boat is measured by the quantity of water it displaces. A boat going to Albany cuts a sluice in the water, whose section is a section of the boat.

The discussion is to be resumed at the next meeting

## A COLUMN OF VARIETIES.

Information has been received from J. C. Helm Esq., the United States Consul-general at Havana, of the publication of a royal decree, granting exemption from import duties on steam engines and other manufactures intended to be used in the cultivation and preparation of coffee, which privilege has been hitherto enjoyed only in relation to such articles as were imported for sugar plantations.....Mr. Thompson's process of purifying copper consists in melting 100 parts of that metal with ten parts of copper scales (black oxyd) along with 10 parts of ground bottle glass. After the copper has been kept in fusion for half an hour, it is found pure at the bottom of the crucible. Perfectly pure copper has been thus obtained from brass, bell metal, gun metal, &c., containing from 4 to 50 per cent of iron, lead, antimony, bismuth, arsenic, &c.....Sir Marc Isambard Brunel left France in consequence of the French revolution. He first went to America, where, in 1797, he made experiments with steamboats on the Hudson river, under the auspices of Chancellor Livingston, who was also the patron of Robert Fulton. Sir Marc, at that time Monsieur Brunel, also built the old Bowery Theater in New York.....Steam vessels running in hot climates require very large condensers, owing to the warmth and saltness of the water. The temperature of the Red Sea is about 90°, whilst it contains also a greater quantity of salt than ordinary sea water. The specific gravity of ordinary sea water being 1,026, that of the Red Sea has been found to be, in some instances, 1,080.....A cast steel shaft, made by Fred. Krupp, of Essen, Rhenish Prussia, was 30 feet long, and 10 inches in diameter. It is now in use on a French steamer. The same maker has produced a single piece of steel weighing 20,000 lbs., or twice the weight of that sent by him to the Paris exhibition.....Castings of irregular forms and varying thickness are strained in cooling, and cast iron wheels with light rims and heavy naves often break of themselves soon after being taken from the mold, unless careful provision has been made for the unequal contraction of their inner and outer portions.....In tinning copper it is first cleaned with sandstone, and then heated and rubbed over with sal-ammoniac. The tin, mixed with powdered resin, is then placed on the copper, which is made so hot as to melt the tin, and to allow of its being spread over the surface with a pad of tow.....Professor Robinson's rule for estimating the strength of cordage is to square the circumference of the rope in inches, and take one-fifth of the number for the weight in tuns which the rope will bear.....No person can legally obtain a patent in Canada unless he be a resident of that province. The Canadian Parliament has appointed a committee to report, this month, a bill embodying an improved patent system.....The majority of the locomotives employed upon the Canadian railroads have been made in the United States, and exported into that province under an *ad valorem* duty of 12½ per cent.....The summit of the Copiapo Extension Railroad in Chili is 4,470 feet above the sea.....The summit of a branch railroad to be built from the Copiapo Railroad will be 6,624 feet above the sea.....The greatest range ever obtained by any Armstrong gun was 5 miles 330 yards. This was the 32-pounder, fired with a charge of 6 lb., at an elevation of 35°.....In his later works of bridge construction, Mr. Stephenson abandoned the cellular system originally adopted in the Conway and Britannia bridges.....Mr. Fairbairn has found that some iron ships, built a few years ago, would, if suspended amidships, as on a sharp reef, break by their own weight.....The bells of the ornamental clocks made in Paris, have been found by analysis to contain 72 parts of copper, 26·56 of tin, and 1·44 of iron.....Of 1,089 cases of fire in London, in the 1850, 30 were from spontaneous ignition. One of these cases was that of the spontaneous ignition of coal..... The magnifying power of the diamond, in proportion to that of plate glass, ground to the same form, is as 8 to 3... Mr. Whitworth has fired from a hexagonally bored 24-pound howitzer, shells of ten diameters in length..... The browning process, in the manufacture of the Enfield rifle occupies four weeks.....It is impossible to pass the flame of ordinary fuel through a tube of any length..... A diamond point used as a drill, will perforate through the hardest file. A good hard common steel point will also drill through a file, if it has a high velocity, and plenty of cold water be used to keep it cool.....The population of Victoria numbers 334,110 males to only 191,257 females.

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## IMPROVED HORSE RAKE.

The hay crop of the country amounts to more in value than that of any other agricultural product, and, with the single exception of the plow, there is probably no other agricultural implement which has saved so much manual labor as the horse rake. For a long time our inventors seemed to rest contented with the old simple revolving rake, but within a few years, since so many brilliant fortunes have been made in the patents of agricultural implements, extraordinary attention has been given to this implement, and we have been busy in obtaining patents for inventors of improvements in this kind of machine. The most fruitful of all these inventors is Mr. Stoddard, one of whose machines is illustrated in the annexed engraving.

The principal peculiarity in this improvement consists in the arrangements by which the rake is turned back to deposit the hay in the windrow, by means of the power of the horse; the muscles of the driver being required merely to throw the parts into action at the proper time.

The rake head, A, has a rocking motion by which the teeth may be turned backward and upward to a level with the axle. This rocking motion is effected by the friction wheel, F, acting through the shaft, E, crank, D, rod, C, and arm, B, which latter is rigidly secured to the rake head. The shaft, E, has one of its bearings in the sliding block, G, and when this block is pushed back the friction wheel, F, is brought in contact with the inner surface of the projecting rim of the driving wheel, but when the block is pushed forward the friction wheel is brought in contact with the outer surface of the friction roller, H, tending to turn the wheel, F, in the opposite direction. The sliding of the block, G, is effected by a crank upon the shaft, I, this shaft being rolled by the feet of the driver upon the treadles, J J. To hold the teeth down so that they will gather the hay, the wheel, F, is pressed against the friction roller, H, but when the windrow is reached, the shaft, J, is turned so as to carry the wheel, F, against the projecting rim of the driving wheel, which causes it to roll in the opposite direction, thus turning the teeth upward and depositing the hay.

In transporting the rake to and from the field, the teeth are turned upward and secured permanently in place out of the way of all obstructions by the lever, K, which has a hook upon its lower end, which hook catches under the rod, C.

The advantages of this machine are thus stated by the inventor:—

1st. "The labor usually required in holding the rake and throwing it up is absolutely transferred to the horse by means of the friction wheel, thns dispensing entirely with hand levers, and leaving both hands at liberty to guide the horse. I claim that this is the first time in the history of the country that the thing has been accomplished.

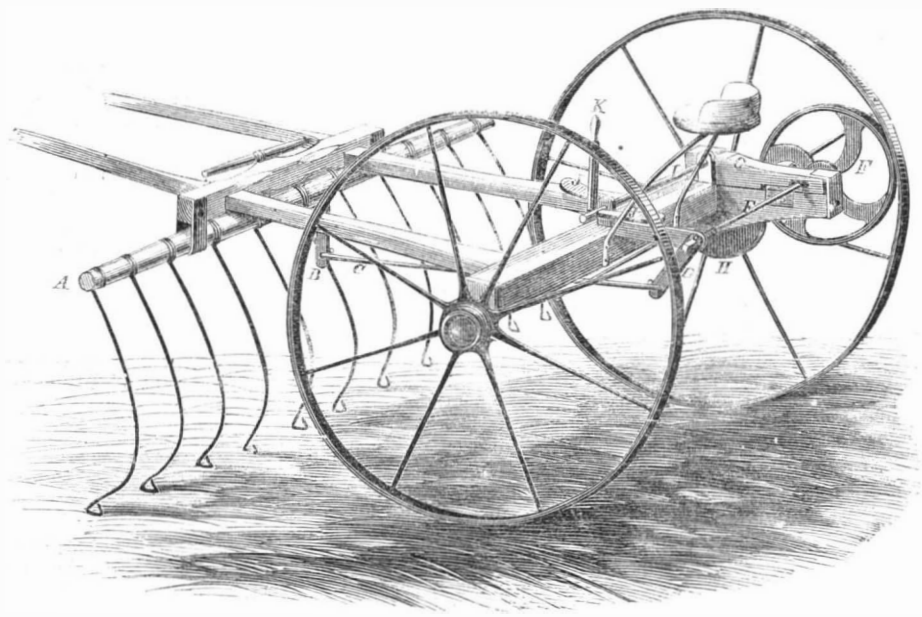
2d. "The rake can be thrown up while *backing* as well as when moving forward.

3d. "The rake conforms to the uneven surface of the ground, *independently* of the wheels.

4th. "A shoe being formed of the tooth prevents the raking up of *dead* grass and raising the dust.

5th. "The rake being placed in front of the wheels, the wheels can be placed as *near* together as is desirable."

Application for a patent for this invention has been made through the Scientific American Patent Agency, and persons desiring further information in relation to it will please address the inventor, J. C. Stoddard, at Worcester, Mass.



STODDARD'S IMPROVED HORSE RAKE.

A revolving reel, consisting of four rakes, is hung upon an axle, A, as shown in the cut. This axle has its bearings in two levers, B B, which are pivoted upon the frame of the carriage with their upper ends inclined backward, so that the friction wheels, C C, may be pressed by the weight of the reel against the inner surface of the projecting rims of the driving wheels, D D, thus causing the reel to rotate, by which motion the hay is thrown over the reel, tossed in the air, and left evenly and lightly spread over the ground. The lower ends of the levers, B B, are connected with the rods, E E, which have their opposite ends pivoted to the cranks, F F, upon the rod, G, so that, by rocking this rod by means of the lever, H, the friction rolls, C C, are brought forward from their contact with the rims of the driving wheels, and thus the rotation of the reel may be stopped when it is desired to suspend the operation of the machine. A pawl and ratchet, I, are provided to prevent the shaft, G, from turning back until the operator desires.

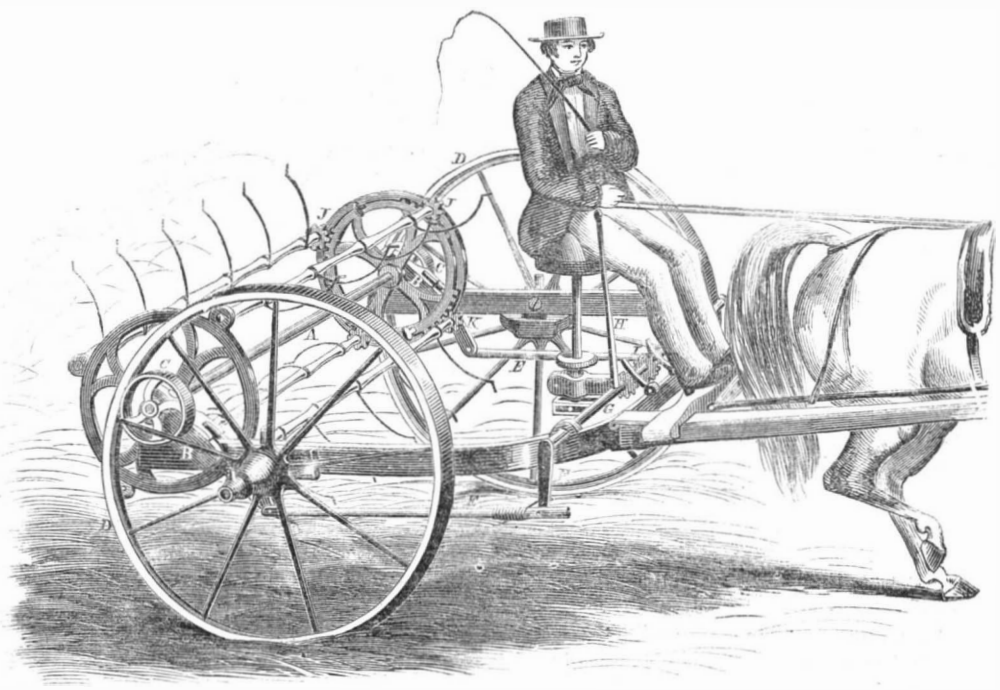
Small pinions, J J J J, are placed upon one end of the rake-heads, and these pinions gear into segments of a partially revolving ring at the end of the reel, so that, when one rake-head is turned upon its axle, a corresponding motion is imparted to its three fellows, and the four turn in unison. This arrangement enables the teeth to be readily turned inward out of the way of contact with any external substance, or to be adjusted to any angle of inclination; a set screw being provided to secure the ring to its adjustment. The peculiar form of the teeth will be readily seen by inspecting the cut, the oulder being provided to prevent the hay from sliding down the tooth to the rake-head.

The importance of machines which facilitate the securing of the hay crop can only be appreciated by considering the immense number of square miles which have to be repeatedly gone over in this operation, and that the work has to be done in a short time, making it the busiest season of the year.

Application has been made, through the Scientific American Patent Agency, for a patent for this invention, and persons desiring further information in relation to it will please address the inventor, J. C. Stoddard, at Worcester, Mass.

## IMPROVED HAY-MAKING MACHINE.

On page 368, Vol. I. (new series) of the SCIENTIFIC AMERICAN, we published an illustrated description of a hay-making machine invented by Mr. Stoddard, and the annexed engraving illustrates an improvement in that machine, the improvement consisting principally in the form of the teeth and in the construction of the reel.



STODDARD'S IMPROVED HAY-MAKER.

## FEATHERING PADDLE WHEELS.

The steamboat *Richard Stockton*, a large and splendid iron passenger vessel, belonging to the Camden and Amboy Railroad Company, is furnished with feathering paddle wheels. The buckets are pivoted to the wheel frame, and suitable cranks and arms connect the buckets with a cam arrangement at the center, so that as the wheel rotates the paddles enter and leave the water vertically.

These wheels have been in use on the *Stockton* for several years, and, we believe, are considered a success. All the parts are made of iron, put together in the strongest manner. When in motion there is but little of that tremor or jarring which is so frequently experienced on other steamboats.

On the 30th ult., while the *Stockton* was coming up the harbor of New York, from Amboy, N. J., at full speed, one of the movable buckets suddenly broke and fell out, and other parts of the wheel were so displaced as to come in contact with the guard and wheel-house, tearing the latter open and doing considerable damage, and rendering it impossible for the vessel to proceed. No person was injured.

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VOL. II., No. 16.....[NEW SERIES.]....*Fifteenth Year.*

NEW YORK, SATURDAY, APRIL 14, 1860.


## FIRE-ESCAPES.

THE burning of a number of human beings which has been repeatedly done within the last few months, has sent a thrill of horror through the community, and has completely aroused our citizens to a determination to adopt the most effectual means possible to prevent the recurrence of such events in future. In carrying out this resolution several kinds of apparatus are offered for our choice, three of which have been recently pressed upon the attention of the public. One of these consists of the several modifications of the extension ladder, to which class belongs the apparatus in use in London, of which we present an engraving on another page.

Another device which has been attached to the top of the City Hall and exhibited to crowds in the Park, is a canvas tube stretched from the top of the building at an inclination to the ground so that persons might slide down through it with ease and safety. This of course requires some accessory apparatus for raising its upper end and attaching it to the building, and is objectionable on account of its great weight and its liability to take fire from the flames issuing from the windows.

But the system which has attracted the most favorable notice is that exhibited by some of our German citizens and which has been in practical use in Germany for several years. It consists of a light ladder about 15 feet in length, with stout iron hooks at the upper end, of sufficient size to catch over the window sill. The fireman hooks the ladder to the sill of the window above him, mounts and enters the window, then draws up the laddar and hooks it to the window of the next story above, thus ascending one story at a time, and reaching the top of the highest building, simply by means of one short ladder. He carries at his belt on one side a small axe for prying open doors &c., and on the other a coil of strong cord, of the very best material, about $\frac{3}{8}$ of an inch in diameter, and 90 feet in length. With this cord he can draw up one end of a canvas tube if needed, or he can let down any person, or even, in a case of emergency, use it for his own escape. It is impossible to conceive of any apparatus cheaper, lighter or more portable than this. One man takes it on his shoulder and runs with it through the empty streets or makes his way through a crowd almost as fast as he could without any incumberance, while the exceedingly low cost would enable these ladders to be provided in almost unlimited numbers, so that some one of them might be in the immediate vicinity of every house in the city. Each fire-engine and hose carriage could be furnished with one or more, and the firemen trained to their use.

Let, however, the several plans proposed be fully examined, not, by any means, neglecting the numerous modifications of the extension ladder. We understand that one of these, 80 feet high, is in practical operation in Albany, and is giving very complete satisfaction. We shall next week present to our readers an engraving of one of the best of this class of fire-escapes, with a full description.

Not less important than the selection of the best apparatus is the adoption of the best plan for the organization and support of the establishment. In France, of course, this matter, as well as almost all others, is under the control of the government, which likes to have its finger in every pie. The Frenchman is taught to look to the police for directions almost how to tie up his children's shoes and wipe their noses. But all people who have acquired that highest and noblest of all arts—the art of self-government, have discovered that nearly all affairs can be more efficiently and more economically conducted by a compact and intelligent voluntary association, having but one object of attention, than they can by the clumsy machinery of the national or municipal organizations. All experience teaches us that if we leave this matter to our city government, it will probably be some two or three years before they will come to a decision, after which it will take at least several months more to go through all the processes of advertising for contracts, and getting the thing into practical operation. But a society might be organized, the funds raised, the apparatus constructed and properly distributed, all ready for use, in the space of one month.

It is creditable to the humanity of the city that such a movement has been begun, and we have no doubt it will commend itself to the favor and support of the community. Such reasonable aid as the association may ask of the city government, should certainly, under proper guarantees, be promptly conceeded, but we hope no delay will take place for the sake of *awaiting* this action of our municipal authorities.

JUDGE MASON IN WASHINGTON.—People come from a distance often to consult Judge Mason on matters of infringement, interference, appeal, extension, &c.; and they are disappointed to learn that he is temporarily absent, and that they cannot see him. For ten days past, Judge Mason has been in Washington, conducting one of the most important extension cases ever brought before the Patent Office. On the 16th inst., he will return to this office again, and be prepared to consult with inventors and patentees as usual. All communications on professional business should be addressed to MUNN & Co., No. 37 Park-row, New York.

## NOVEL AND EXCITING SPORT.

The breaking-up of the ice on the North river has brought to an end, for this season, a series of the most exhilerating of all winter sports, which have kept the inhabitants of the several towns and villages along the Hudson, from Cold Spring to Troy, in a state of merry excitement during the past winter. The idea of sailing on the ice by the force of the wind has probably occurred to hundreds of people, and many attempts have been made to reduce it to practice, but it has been reserved to the inhabitants of this State to produce a really practical ice boat, and, as in many other things, the reality surpasses the most extravagant anticipations which had been formed in regard to it.

The *speed* of the ice boats is the thing which is especially astonishing, and which makes this sport so intensely exciting. With a strong breeze they glide with the velocity of a dried leaf over the ice, sweeping past the express trains of the Hudson River Railroad, literally on the wings of the wind. They are also found to be far more completely under the control of the helmsman than any water boat, a change of one-sixteenth of an inch in the position of the rudder altering at once the direction of the boat, and being sufficient even, when close hauled, to shake the wind out of the sails.

The practical ice boat is of triangular form, with one angle at the stern and one side forward, and is fitted with outriggers which are attached to a plank laid across the bow. These outriggers are runners, and the boat rests upon them and upon the rudder, which is also a runner. If the boat is 12 feet long, the runners are placed 12 feet apart. A light platform rests upon these three supports, and thus the whole thing is cheap and simple. A sloop rig is adopted; the sailor reclines comfortably at the stern, enveloped in furs, with or without the company of one or more fair companions, and sails swiftly along in the fastest vehicle that was ever yet under the control of a single rider.

We are told, by Mr. Stevens, of Poughkeepsie, that there has been the greatest rivalry all along the river in getting the fastest boats, and that thousands have gathered on the banks to witness the gliding, turning and swallow-like sweeping of these sailors of the frozen sea. No doubt another winter will witness the spread of this rare and rolicking sport all through the northern portions of the country; and gentlemen who wish to keep up with the times will do well to have their boats ready in the Fall, to lead off the fashionable fun in their respective neighborhoods.

## PRESENTATION OF A GOLD SNUFF-BOX TO AN INVENTOR.

We have just seen a magnificent gold snuff-box which was presented by the Boston and Lowell and Nashua and Lowell Railroad Company to the Hon. Henry Ruttan, of Cobourg, Canada West, as a recognition of the value of his plan for ventilating cars. Judging from its color, we suppose it is 24 carats fine; that is, absolutely pure gold. It is elegantly modeled and engraved, and cost about $350.

The one intolerable annoyance of railroad traveling in dry weather is the dust. It rolls up in smothering and suffocating clouds, not only loading the eyes and mouth and nose and cars of the passenger, but penetrating every part of his clothing, and completely covering him from head to foot. We know of no greater boon that could be bestowed on the whole traveling community than the complete abatement of this insufferable nuisance; and we are not surprised at the readiness of our railroad companies to recognize the value of a successful invention for this purpose.

Mr. Ruttan has been engaged several years in investigating the subject of ventilation, and has devised a plan which is stated to render cars perfectly free from dust in the summer, and to supply them abundantly with pure air in the winter. He takes the air in at the top of the car, carries it around the sides and under the bottom, where it passes over a shallow pan of water, into which it deposits its dust. It then rises through pillars in the car, and is distributed above the heads of the passengers, passing out in the rear, and forming a gentle current, clean, cool and refreshing.

We are glad to find that some of our railroad companies are abandoning the "old fogy" conservatism which has caused them to turn the "cold shoulder" to the inventors of all improvements in their line; and we trust that travelers are not much longer to be smothered in the dust which they have been condemned to breathe ever since the introduction of railroads.

## OUR CORRESPONDENCE.

We invite attention to the varied character of the correspondence in the present number of our paper, contributed by all classes of minds—from the tyro of eleven years, making his first timid essay in experimental philosophy, to the veteran and illustrious masters of every science. We desire to encourage this correspondence on all the broad fields embraced in science and the mechanic arts, making our journal more and more the medium of intercommunication between all the varieties of intellects throughout the land; not doubting that, in this way, we shall best adapt it to the multifarious tastes to be found among our thousands of readers.

## HOWE'S SEWING MACHINE TRIAL.

In our correction (on page 224) of a notice of the above trial we stated that the court ordered an injuction against the defendants. We should have added that the court ordered the parties to be enjoined unless they gave bonds, and that one of the defendants—Mr. Williams—entered the required security; so that no injunction was placed upon him. His case will come up for full trial hereafter.

THE RENOWNED GENERAL TOM THUMB!—With our family we spent an evening last week, very pleasantly, at one of this little gentleman's levees, which he nightly holds at Hope Chapel, No. 720 Broadway, in this city. We first saw the General fifteen years ago, when we thought him one of the greatest wonders of the age. Since that time he has traveled over the continent of Europe twice, and has been exhibited in every city and almost every town in the Union. The marks of age begin to creep upon the General's fair face, arising probably from his almost constant exposure in traveling by sea and land. Charles C. Stratton is the General's real name, and to his first manager—P. T. Barnum—he is indebted, we believe, for his *professional* name. The

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subject of these remarks is 22 years old, perfectly formed in every respect, is intelligent, well educated, and weighs only 33 pounds! There are few places in the city where the old and young can spend an hour more pleasantly than by dropping into Hope Chapel, any afternoon or evening, and witnessing the exhibition of this very small specimen of humanity.

## CHILDRENS' CONFIDENCE—HOW THEY SHOULD BE TREATED.

The annexed article (copied from *Life Illustrated*) we commend to the perusal of parents. It contains good practical advice; and if it is diverging a little from our sphere to publish such articles, we are sure it will be read with interest and benefit by many of the readers of the SCIENTIFIC AMERICAN:—

"Do you want to learn how to make the children love you? Do you want the key that will unlock the innermost recesses of their natures? Then sympathize with them always. Never allow yourself to ridicule any of their little secrets. Never say, 'Oh, pshaw!' when they come to show you a new kite or marvelous top, and 'I can't be troubled,' when the hard knot won't be untied, and two and two obstinately refuse to make four on their little slates. Kites and knots are only the precursors of older thoughts and deeper trials which the parents may one day plead in vain to share! Don't laugh at any of a child's ideas, however odd or absurd they may seem to you; let them find your sympathy ready in all their wonderments and aspirations. Is there any man so wise in his own conceit as to have forgotten that there was a time once when he, also, was a child? The little folks are too much crowded out in this world; people generally seem to think they can be put in anywhere, or made to eat anything, or crammed into any out-of-the-way corner, to amuse themselves anyhow. We don't agree with these cross-grained wiseacres. Children have just as much right to the car window and easy seat as anybody. It don't take much to make a child love you and trust in you, and the benefits to him are absolutely incalculable. Oh, how much better it is for children to bring all their cares and troubles and temptations under the gentle eye of a wise parent! What a safeguard it is for them to feel that there is always a kind ear to listen to their doubts and griefs, and a gentle shoulder for their little heads to nestle against! Respect their rights; never think you can say bitter things in their presence, or do unjust actions. They are the finest discriminators of fair and unfair in the world. Somebody says: 'When you are inclined to be cross with children for being slow to learn, just try a moment to write with your left hand. See how awkward it proves, and then remember that with children it is *all* left hand!' Preserve us from those precocious infants who spring up ready-made philosophers and casuists; cherry-cheeked little blockheads are infinitely preferable. Above all, do not be ashamed to let them *know* that you love them. Remember, they will be men and women some day, and the slightest word which may influence their future lives should become a thing of moment in your eyes."

UNDERDRAINING WITH MOLE PLOWS.—Writing from Madison county, a correspondent of the *Ohio Cultivator* says: "I know of some ditches that have been in operation in this county near three years, and the unanimous testimony thus far is, that they are now better than when first completed, and that instead of crumbling and filling-up, (as many would have us believe is the case), they improve with use and age, and now discharge more water and more freely than at first. Now this cannot be ascribed to great falls, thereby giving the water a strong forward impetus. On the contrary, this country is notoriously level, and particularly those sections that have been ditched with little descent—mostly natural prairie lands; and yet these same ditches, many of them, have furnished an abundance of clear, good water for stock, even during the greater part of the extreme drought of the past summer, when wells, stock-pools, and running streams failed in part or entirely, and this supply, too, coming from fields that had hitherto been cultivated in corn with fair results, and were but a few years ago considered sufficiently drained by natural surface drainage. But our farmers now find that the more underdrains through their fields, the better results and returns for labor, and that, in either wet or dry summers, crops mature earlier and better when the ditcher has been most employed."

## AMERICAN NAVAL ARCHITECTURE.

[Reported expressly for the Scientific American.]

### THE STEAMER "AUSTIN."

This steamer is from the hands of the well-known builders, Harlan, Hollingsworth & Co., of Wilmington, Delaware, and adds another to the many well-earned triumphs in the construction and ultimate success of fast and sea-worthy steam vessels. She has just left this port for her appropriate place on the route of her intended service—New Orleans to Brazos. We herewith give full and minute particulars relative to her construction:—Length on deck, from fore part of stem to after part of stern post, above the spar deck, 204 feet; breadth of beam (molded) at midship section above the main wales, 34 feet; depth of hold 10 feet; depth of hold to spar deck, 17 feet 9 inches; draft of water at load line, 7 feet 8 inches; dip of wheel at load line, 5 feet, 3 inches.

Her frame is of wrought iron plates, ½ to ⅝ of an inch in thickness, and securely fastened with rivets ⅝ of an inch in diameter, every 2¼ inches. The floors are shaped I, molded 4 inches; sided 1⅛ inches; depth, 18 inches; thickness, 7-16 and ½ of an inch, and finished with angle iron. Frames are 16 and 18 inches apart at centers; keel 5 inches deep, shape U, double. Keelsons are 12 in number, fore and aft, 20 inches high by ½ of an inch, and 9-16 of an inch in thickness; ceiling of white pine, 2 inches deep on the top of keelsons.

She is fitted with one powerful vertical beam condensing engine; diameter of cylinder 44 inches; length of stroke of piston 11 feet; diameter of water wheels 30 feet; material of same, iron; number of blades, 26; width of blades, 6 feet 7 inches; depth of same, 1 foot 11 inches.

She has one return tubular boiler, the length of which is 24 feet; width, 16 feet; and 9 feet 2 inches in hight; located in hold, and has a water bottom; does not use blowers to furnace. The fire bars are 6 feet 4 inches in length; flues below in boilcr are 8 in number; flues above, the same; length of flues above, 19 feet 3 inches: length of flues below, 15 feet 8 inches. Ample protection with iron and felt has been made against fire communicating to the wood-work from the boiler.

The hight of smoke pipe, above grates, is 51 feet; diameter of same, 65 inches; area of heating surface, 2,000 square feet; capacity of coal bunkers, 265 tuns. She has one smoke pipe, one extra size independent steam fire and bilge pump, one bilge injection, and bottom valves or cocks to all openings in her bottom. She has three water-tight athwartship bulkheads, and four cargo or loading ports. The maximum pressure of steam is 25 pounds; cut off at half stroke, and the maximum revolutions at the above pressure are 17.

Her cabins are finely fitted-up and afford pleasant and comfortable accommodations for passengers. She is owned by Charles Morgan, Esq., of this city. The tunnage of this steamer is 650 tuns.

## WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

### WELDING TOGETHER LARGE WROUGHT IRON PLATES.

If large plates or planks of wrought iron such as are used for steam boilers, ships' "skins," decks, &c., could all be welded together in one piece, instead of riveted, the same strength would be obtained with two-thirds the thickness of metal, or with the same thickness of metal one-third more strength would be obtained. J. C. Cooke, of Middletown, Conn., has devised an invention which consists in effecting the above object, and in welding together very large and unwieldy planks of wrought iron, such as cannot be brought to the smith's forge, by the employment of a portable apparatus consisting of hammers or rollers which may be clamped to the plates to be welded, and moved along as the welding proceeds; and also in the use of the aero-hydrogen or oxy-hydrogen flame, for heating the plates to the "welding point," thus virtually taking the fire to the work instead of the work to the fire. The gas used excludes atmospheric air from the plates at the welding point, and thus prevents oxydation and consequently the formation of scale.

### FILES.

This invention is more especially applicable to files for filing soft metal and their alloys and wood, its object being to prevent the clogging of the teeth, which is the cause of so much trouble in the use of files of ordinary "cut" on such materials. It consists in the combination with a suitable transverse cut, of longitudinal grooves. The credit of this invention is due to Pietro Cinquini, of West Meriden, Conn.

### POLYGONAL SHAPED ARTICLES.

This invention consists in combining a turning lathe having a pattern attached, with a rotary planer and turning tool in such a way that the work is first turned and then planed or cut in polygonal form; the pattern serving as a guide to both the planer and turning tool. The invention also consists in a peculiar arrangement of the planer and the turning tool, whereby they may be readily adjusted in the prosecution of the work, as may be required, and allowed, when at work, to be perfectly operated upon by the pattern so as to effect the desired end. The inventor of this improvement is John Cook, of Buffalo, N. Y.

### GRINDING MILL.

This invention consists, 1st: In an improved mode of hanging the runner, whereby it is allowed, as it rotates, to conform to the position of the stationary stone, and the parrallelism of the two stones preserved. The invention consists, 2d: In an improved bush, constructed with a view of keeping the spindle perfectly lubricated, and at the same time confining the oil within its chamber and protecting the same and the part of the spindle within the bush, from dust and the admission of all other improper substances. These improvements were designed by Edmund Munson, of Utica, N. Y.

### MEASURING FAUCET.

This invention consists in applying a weighing device to a faucet in such a way that the substance to be drawn may be measured by weight, and the flow of the substance be automatically cut off by the gravity of the same, when the proper or desired quantity has passed into the vessel prepared to receive it. This device has been patented to George K. Babcock, of Utica, N. Y.

## FOREIGN NEWS AND MARKETS.

*Conroy's Cork-cutter.*—A recent number of the London *Spectator* has the following article on American ingenuity, as exemplified in the manufacture of corks by machinery invented by Edward Conroy, of Boston, Mass., who obtained a patent, through the Scientific American Patent Agency, on Nov. 2, 1858. An illustration of this ingenious machine was published on page 345, Vol. I. (new series) of the SCIENTIFIC AMERICAN:—

"Hamlet alludes to a certain large form of cork with contempt; but Hamlet, excellent as he was in qualities of head and heart, was not a practical man. Even he, however, might have been impressed with the statistics of the trade, if Horatio had brought them before him. Take the number of corks alone: how many are there used in London daily? One million. One city firm consumes 7,200,000 annually. What is the function of the cork? It is to combine thorough inclosure of fluids we value, for health, for pleasure, for medicament, with thoroughly ready outpouring. Of course, in a population of 2,300,000—exclusive of the British empire ("on which the sun" &c.)—it is important to keep up the supply of these precious but perishable helps; but heretofore the making of corks has been an art and mystery. The cork-cutters boasted that the thing could only be done by hand. The cork was, as it were, the outpost of the printer's composing desk; it has surrendered; corks are cut by machinery. On the 3d of September last, we described a machine which accomplished the work well and rapidly, insomuch that two men could turn out 100 gross in 10 hours—14,000 a day, or 4,300,000 a year—or about one-ninetieth part of the corks needed by this devouring metropolis. So well are the vast figures of modern statistics to be met by modern mechanical invention. But we have a growing population, and a wine trade about to enjoy a sudden development; and we have this week described the more powerful machine to meet that larger want. The cork-cutters must be delighted. Not at all. Like Austria, instead of identifying themselves with the progress of the age, they identify themselves with its petrified 'stability.' They are firm in the faith that corks can only be cut by hand; they are sure that they ought only to be so cut; and the consequence is that the trade is passing out of their hands to that of boys, the rising cork-cutters, the cork-cutters of the future! For, with the new American machine, one

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boy can turn out from fifty to one hundred gross a day. Surely, the old cork-cutter of the past is ambitious of being a fossil—he longs to be one atom in the strata which we are constantly burying and leaving, in our upward march of earth! But, if "Young America" is bright in invention, and can dash out a cork, has not this great country (head of the machine-making world) a new branch of trade brought to it, in the shape of the new cork-cutting machine? By no means. There is conservatism also in the trade of engine-making. The patentee of the machine finds that he can carry the iron from England to America, have the machines made in America—and they do not accept low wages there—and bring it back to England cheaper than he can have it made in England. Now why is this? The reason is as plain as the cork from your bottle of champagne. In the making of the machine, a machine is used; in that prior machine there is a certain shaft, which shaft, in England, is formed turner-wise, by hand, in America it is done by machinery. There they make the machines *to* make the machines *that* make the machines of the cork-cutter."

*Explosion in a Coal Mine.*—An explosion of gas in a coal mine occurred in the early part of March at Burraden, Northumberland, by which 73 men and boys came to a ghastly and untimely end. About 120 men were employed in the mine, which was of immense extent, one passage in it being more than a mile in length. The gradual accumulation of the gas had been perceived for more than six weeks, and several of the men had left the mine from fear of an accident. A slight preliminary explosion gave warning to a portion of the hands, a few of whom escaped in consequence. The principal explosion was of tremendous force, destroying the machinery and wagons, and instantly killing the larger portion of the persons employed.

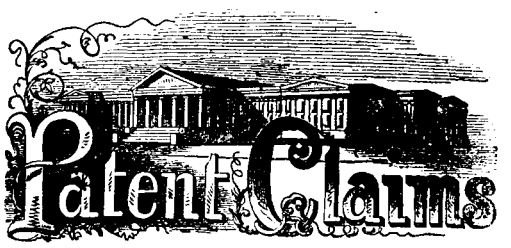
## REMARKABLE DISCOVERY AT ROME.

The Detroit *Advertiser* (of March 24th) publishes a private letter, written by Lewis Cass, Jr., to Rev. Mr. Duffield, of Detroit. From this letter we make the following extracts:—

"In the progress of the excavations on the Palatin, where stood the house-of-gold of the Cæsars, a fragment of an arch, covered with inscription and delineations, was brought to view. Further explorations in the same direction resulted in the exposure of a room, on the walls of which was found a sketch, cut or engraved with a sharp-pointed instrument, of a crucifix, together with the figure of a man in the attitude of prayer, standing near it. The announcement of this discovery created great interest. By order of the Pope, the design was removed from its position, happily without injury, and confided to the care of Monsignore Macchi, who invited me to inspect it, and by whose permission I procured a copy to be made, which is herewith enclosed. It is needless to say that this event has elicited elaborate speculations. Notwithstanding a general discrepancy, the conflicting views concur, with scarcely an exception, in the conclusion that the aim of the sketch was to cast ridicule on the worship of the Christians. It presents the outlines of a cross, on which is a human figure bearing the head of an ass. A tunic envelops the waist, and the arms and legs are partially covered with bandages. To the left, with one hand raised in the posture of adoration, as depicted on ancient monuments, appears the form of a man, while below is seen the following inscription, 'Alexander adores God.' The execution of the engraving, as you will perceive from the *fac simile*, of which the scale is one-fourth smaller than the original, indicates an entire ignorance of art, being stiff and hard, without ease or grace whatever. Satisfactory evidence refers the date of it to the reign of Septimus Severus. There were numerous Christians in his court, one of whom, it is supposed, of the name of Alexander, was thus exposed to ridicule by his pagan associate or companion.

"Familiar as you are with the early history of our religion, it is unnecessary to recall to your recollection the existence of the legend, current throughout the Roman dominion in the days of the empire, that the Christians worshiped a divinity whose head differed in no respect from that of an ass. In Africa, then filled with rich and splendid cities, this was the popular belief. It was inculcated in the Magian school of Asia, from the sands of Parthia to the Pisidian forests, and levelled at the converts to the strange faith in the streets of Narheordea, Amida and Mardin-on-the-Hill. The later Gnostics in particular, more especially the sects of Bardesanes, omitted no occasion to disseminate this calumny, accompanied with every epithet of contempt and detestation. At Orla it was proclaimed from the throne in the sounds of trumpets, followed by a decree prohibiting the use of arms and the Arabic language to the worshipers of the God of Nazareth, and requiring them thenceforth to wear girdles of leather in token of their obnoxious creed. We meet with it in the writings of Tacitus, a bitter and relentless enemy to the Christians, whom he styles outcasts of the human race. It is also alluded to in the pages of the contemporary fathers, by whom it was repelled with vehement and irrepressible indignation. The origin of this monstrous invention is lost to us. There can be little doubt, however, that it had its foundation in the hatred with which the disciples of the pure and spiritual doctrine were invariably regarded by the idolatrous nations among whom they lived. But whatever the source, the first mention of this calumny occurs in the records relating to the period intervening between the years 120 and 250 of our era, subsequent to which epoch all trace of it disappears. Precisely during the same period the room in which the design was found was constructed. The palace of the Cæsars on the Palatin, as you are aware, was the growth of successive reigns. That part of it which embraces the chamber in question was built by Hadrian, as the bricks of which it is chiefly composed attest. They are impressed with the names and titles of the Consuls Pactinus and Apronicanus. This coincidence—the prevalence of the legend in the years already mentioned, and during that period only, and the erection within the same time of the wall on which the drawing is traced—establishes satisfactorily the purpose of the sketch, as well as the date of its execution. Still more conclusive, perhaps, is the manner in which the figure upon the cross is presented to view. It is delineated with drapery, while it was the invariable practice in executions of this nature—a mode of punishment very common among the Romans—to expose the victim or criminal in a state of nakedness. The discrepancy finds its sole warrant in the tradition that our Lord was put to death with a garment about his loins, and its admission in a work emanating from the hands of a pagan whom we cannot suppose to have been influenced by any sentiments of awe or respect, and whose experience would never have suggested such a departure from the uniform custom, indicates clearly a caricature, of which the first requisite is uniformity to its prototype. Finally, the words, 'Alexander adores God,' admit of no other interpretation; nothing in history, legendary or monumental, tending to the idea that the symbol of a crucified being was ever regarded as an object of veneration by any other sect than the followers of Christianity."

LITERARY MONOMANIA AND DISHONESTY.—The foreign papers report that recently, at Leipsic, a case of singular monomania led to a most deplorable result. Dr. Lindner, a professor of theology at the University of that town, was tried for the purloining of manuscripts from the Academical Library, and sentenced to six years' penal imprisonment. The unfortunate man had allowed himself to become the slave of a paramount passion for old parchment. To know a fine, rotten, and worm-eaten codex to be within his reach, yet not in his possession, was too much for the moral strength of this *savant*, otherwise of irreproachable character. Beginning with the abstraction of one or two remarkably fine pages from some manuscript or other, he gradually proceeded to entire volumes, and, during a space or four years, despoiled the library of a great number of priceless rarities. This, though it might have eventually brought about his expulsion from the University, would have scarcely subjected the bibliomaniac to the penalties of the criminal law. But, with a looseness of principle which the jury found it impossible to overlook, Dr. Lindner occasionally bargained away his ill-gotten treasures for others, receiving the difference in money whenever there was a disparity in the value of the manuscripts exchanged. But for the great liberty granted to German professors in the use of public libraries, his criminal proceedings must have been discovered long ago, as his dishonesty was certainly not greater than his folly and want of the most ordinary caution.




ISSUED FROM THE UNITED STATES PATENT OFFICE FOR THE WEEK ENDING APRIL 3, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*.* Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

27,675.—John R. Albertson, of East Deer township, Pa., for an Improvement in Garden Hoes:

I claim shank, b, shoulder, c, dovetail, d, washer, e, blade, a, with the opening, A; the whole being constructed and arranged as and for the purpose set forth.

27,676.—Edward H. Anderson, of Easton, Md., for an Improvement in Vapor Burners:

I claim the original arrangement of the apparatus set forth, and the new and useful adaptation of them to the purpose of producing a light which will be economical in cost, and which will be entirely exempt from the danger attending many other gas lamps.

I also claim the invention of a new and useful mode of procuring light by the combined action of atmospheric air and heat, by means of my original adaptation of the jet holes, N N, in the upper end of the conducting pipe, A, acting upon the under surface of the chamber, D; the blow-pipe principle of the jets producing the requisite heat to manufacture the gas as required for the support of the flame, and which combination enables me to raise the flame above the entire apparatus, thus rendering it clear of all obstructions; all constructed and operating as set forth.

27,677.—Edward Armstrong, of Pittsburgh, Pa., for an Improvement in Governor Valves of Steam Engines:

I claim dividing the valve-chamber of governor valves into two compartments, by means of the division plate, c, provided with valves, j and i, constructed, arranged and operated in the manner described and for the purpose set forth.

27,678.—A. Merritt Asay and J. Lambert Asay, of Philadelphia, Pa., for an Improvement in the Method of Fastening Artificial Teeth:

We claim fastening artificial teeth to a metallic plate by interposing between the said teeth and plate a strip of vulcanizable gum and vulcanizing or hardening the same; the teeth having been adjusted to the plate, as set forth.

We also claim packing with gum the interstices between the teeth and plate or between the teeth themselves, when secured to the plate by riveting or any other of the usual modes, and vulcanizing or hardening the packing after it has been adjusted, as specified.

27,679.—Geo. K. Babcock, of Utica, N. Y., for an Improvement in Measuring Faucets:

I claim connecting to the slide or valve of a faucet, a scale beam or weighing device, arranged to operate as shown, or in any equivalent way, so that the substance to be drawn may be measured by its weight.

I further claim the combination of the scale beam, I, pawl or catch, H, arm, F, lever, D, and valve rod, C, with its valve, B, fitted within the tube, A; all arranged for joint operation substantially as and for the purpose set forth.

27,680.—John Bailey and John Decamp, of Cincinnati, Ohio, for an Improved Spring Bed Bottom:

We claim the arrangement of the side rails, A, transverse rails, B, springs, B d d', slats, C, and straps, E; the whole being constructed and combined in the manner and for the purposes set forth.

27,681.—W. M. Baker, of Walpole, Ind., for an Improved Refrigerator:

I claim the arrangement of a sheet, B, of canvas or other fibrous material, in combination with the grooved and perforated or slotted sides, b, of the case, A, and with the reservoir, C, or its equivalent, constructed and operating substantially in the manner and for the purpose specified.

[This refrigerator belongs to that class in which the evaporation of water or other fluid is employed for the purpose of cooling articles kept within it; and the invention consists in the arrangement of a piece of canvas or other fibrous fabric over the corrugated or slotted inclined sides of the case that incloses the articles to be kept cool, in combination with a perforated reservoir on the top, and with a receptacle on the bottom, in such a manner that water or other fluid poured into the reservoir on the top is spread by the canvas or other fibrous fabric over an extended surface, where it is rapidly evaporated by the influence of the air that is allowed on both sides of the same, and that by such rapid evaporation, a pretty low temperature is effected and maintained in the interior of the case.]

27,682.—L. B. Batcheller, of Rochester, N. Y., for an Improvement in Machines for Manufacturing Barrel Heads:

I claim the combination and arrangement of the passive disk, C, with the clamping disk, C', hollow cam shaft, G, and foot lever, I, together with the cord, J, for actuating the saw table, U, simultaneously with the clamping of the staves, and the pawl and lever, P, operating conjointly, substantially as and for the purposes set forth.

I further claim the application of the lugs or hooks, k k, to the clamping disk, C', for the purpose of sustaining the staves while being supplied to the disks, substantially in the manner set forth.

27,683.—H. N. Bill and J. C. Bill, of Willimantic, Conn., for an Improvement in Scales:

We claim, first, The combination of the weighted lever, D D', dependent rod, E, vibrating rod, F, perpendicular scale rod, G, and swinging arms, J, arranged and combined substantially as described and represented.

Second, We claim the slotted index hand, L, hung on an isolated center from the fulcrum of the weighted lever, D, in the manner and for the purposes set forth.

[This invention consists in the employment of a gravitating lever, in lieu of a spring or movable weights that are at present in use, and in hanging this lever in a novel manner so as to be effected by the scale beam or a weight placed in the scale pan, and thus register the exact weight of any article placed on the scale beam. It also consists in a novel manner of hanging the registering index hand, so as to compensate for the diminished arc the short arm of the gravitating lever makes as the lever approaches a horizontal line.]

27,684.—Richard F. Bond, of Cambridge, Mass., for an Improved Construction of Clock Weights:

I claim the improved clock weight described, having a groove around its circumference for the reception of the cord, as set forth, for the purpose specified.

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### 27,685.—Francis B. Bowman, of Waltham, Mass., for an Improvement in Scissors:

I claim making the clasp spring, with the separate pivots applied to it, and to enter the joint holes of the separate blades, as specified.

I also claim the arrangement of the clasp spring with respect to the blades and their handles, as specified.

### 27,686.—Edward Brown, of Waterbury, Conn., for an Improved Curtain Fixture:

I claim the disk wheel, D, attached to the journal, a, of the shade roller, A, in connection with the clamp, constructed substantially as shown, and connected with the cord, E, which is wound on the journal, a, of the shade roller; all being arranged to operate as and for the purpose set forth.

[This invention relates to an improvent for raising and lowering the shades, whereby the shade may be adjusted with greater facility and more expediency than by any of the means hitherto used for the purpose. The invention consists in having a cord wound around the shaft of the shade roller, and having a circular disk attached to the roller shaft; the disk being used in connection with a clamp, which is actuated or adjusted by the manipulation of the cord, so as to admit of the shade being wound-up or lowered and retained at any desired hight. This patent has been assigned to the Waterbury Hook and Eye Company.]

### 27,687.—John Brown, of New York City, and Charles R. Ellis, of Brooklyn, N. Y., for an Improved Means of Regulating the Draft to the Fire in Warming Apparatuses:

We claim regulating the amount of air draft admitted to the fire in hot water and other warming apparatuses, by causing the overflow of water induced by ebulition to pass into a suitable vessel and regulate the draft passing through the fire, or the supply of cold air above the fire, or both, by the float and dampers, or any suitable device, as specified.

We also claim opening the draft to the fire after ebulition ceases by the withdrawal of the water from the overflow vessel into the warming apparatus through the siphon, or its equivalent, substantially as set forth.

### 27,688.—William G. Brown and Frederick McKee, of Birmingham, Pa., for an Improvement in the Manufacture of Iron:

We claim, first, Carrying the steam to the pipe, G, in which it is to be superheated through a pipe, L, smaller in bore than the bore of the pipe, G, substantially in the manner and for the purpose set forth.

And we also claim so arranging the pipe, G, with regard to the furnace, as that, while it is heated by the fire in the furnace, and shall jet its heated contents through or over the burning products therein, it shall be duly protected from the intensity of said fire, substantially as set forth.

### 27,689.—Jesse Burroughs, of Ridgway, Pa., for an Improvement in the Purification of Coal and Ores:

I claim preparing coal for burning and ore for smelting, by steaming it with a liquid composition of water, salt, niter, potash and lime, in the proportions substantially as set forth.

### 27,690.—Tyrannus P. Butterfield, of Indianapolis, Ind., for an Improved Device for Tilting the Bolt in Shingle Machines:

I claim the oblong plate, J, in combination with the spring catch, k, for the purpose of operating the table, G, when used in connection with the knife frame, substantially as set forth.

### 27,691.—Pietro Cinquini, of West Meriden, Conn., for an Improvement in Files:

I claim constructing a file with longitudinal grooves and a transverse cut, combining with said grooves to form teeth, substantially as described.

### 27,692.—Elizur E. Clark, of New Haven, Conn,, for an Improvement in Apparatus for Building Concrete Walls:

I claim, first, The combinations of the frames and sheeting boards with the braced uprights or inverted T's, when combined with each other and with the walls and floor timbers, in the manner described, and for the purpose stated.

Second, The cores shown in Figs. 4 to 21, inclusive, made as described, either whole or in separate parts; said cores being provided at suitable intervals either with core points to form recesses in the wall for the reception of the binders or with notches to fit upon the binders, and allow their lower edges to extend down between the said binders to meet that part of the wall which is already built, substantially as set forth.

Third, The combination of the rebated corner stays or guides, O, with the sheeting boards as described, for the purpose stated.

Fourth, The combination with the frames, A B, and sheeting boards, E, of the lining plates, d, of wood or metal, when placed inside of the sheeting boards to facilitate the raising of the frames as stated.

Fifth, The combination of the cleats, P P' P'', and boarding, Q Q' Q'', with the frames which support the sheeting boards, for the purpose of forming string courses, water tables, and other continuous projections, as stated.

Sixth, The combination of the covering piece, S, and the fillet, R, with the perforation in the sheeting boards, for the purpose of forming window sills, caps, &c., as stated.

Seventh, So constructing the frames which hold the sheeting boards that of the connection of the two sides shall be made entirely above the work, so that the concrete boxes may be raised by simply loosening the bolts which hold them together, and without any connection through the wall, as stated.

### 27,693.—P. J. Clark (assignor to S. S. Clark), of West Meriden, Conn., for an Improvement in Cigar and Match Cases:

I claim forming a box or case by means of an outer shell furnished with guides, loops or slides, and two heads united by strips or ribs, the said strips or ribs passing through the guides, and the guides and heads limiting the extent to which the box may be opened and its contents raised up, to be easily taken hold of, as represented.

### 27,694.—P. S. Clinger, of Conestoga Center, Pa., for an Improvement in Hand Cultivators:

I claim the arrangement of the hinged head piece or bar, A, cultivating teeth, B, roller, C, handle, D, and check plate, E, substantially as and for the purposes set forth.

### 27,695.—Ezra Coleman, of New York City, for an Improvement in Attaching the Grinding Surfaces of Quartz Mills:

In combination with the hollow shell, A, provided at its end with suitable shaft bearings, the shaft, G, and detachable grinding surfaces, E and F, I claim the longitudinally-acting screws, l l l, and the radially-acting and concentrically-adjusting screws, f f and h h; the whole arranged, constructed and operated substantially as and for the purpose set forth.

### 27,696.—John Cook, of Buffalo, N. Y., for an Improvement in Lathes:

I claim placing the tool, N, in a sliding box, M, operated by the shaft, O, screw rods, g g, and bar, f, for the purpose of readily adjusting the turning tool with the stick and permitting the tool to be operated by the pattern, as described.

### 27,697.—J. C. Cooke, of Middletown, Conn., for an Improvement in Welding Wrought Iron:

I claim the portable welding apparatus constructed and operating upon the principles described, wherein the heating and hammering or rolling operations are suitably combined and placed under the control of the operator, substantially as set forth.

### 27,698.—John P. Cooper, of Finleyville, Pa., for an Improvement in Machines for Overcoming the Dead Points of the Crank:

I claim, first, The use of the shifting tooth, d, springs, e and i, and stops, f and f 1, when used in connection with the wheel, c, rack, b, and slide, a, as described and for the purpose set forth.

Second, The combination and arrangement of the wheel, c, rack, b, and slide, a, as described and for the purpose set forth.

### 27,699.—William Cooper, of Mount Gilead, Ohio, for an Improvement in Dirt-loading Apparatuses for Excavators:

I claim the combination of the square shaft, a, with the sliding pulley, C, band, E, pulley, x, and plow, B, the several parts being arranged together substantially in the manner and for the purpose specified.

### 27,700.—John H. Crane, of Charlestown, Mass., for an Improved Spring Bed:

I claim the combination and arrangement, substantially as specified, of the spring, b, slats, f, and adjustable frame, a e.

### 27,701.—Daniel Deshon, 2d, of Somerset, Pa., for an Improved Churn:

I claim the combination and arrangement of the racks or breakers, i, vessel, a, pedestal or chair, h, with the rockers, b, with projections, f, and notches, g, in the rocker ways; the whole being combined arranged, constructed and operated in the manner described and for the purpose set forth.

### 27,702.—J. V. Dinsmore, of Auburn, Maine, for an Improvement in Metallic Heels for Boots and Shoes:

I claim securing heels to boots and shoes solidly, in all weather and climates and uses, by clamping the sole by the heel, A, and drawing it thereon continuously by screw, g, and spring, C, acting upon the plate, B, or its equivalent, substantially in the manner and for the purposes fully set forth and described.

### 27,703.—W. B. Dorsay, of Decatur, Ill., for an Improvement in Cultivators:

I claim so combining the hinged beams, C D, of a cultivator with the treadles, H I, as that the driver on his seat may raise either of the two central cultivator hoes, F, separately, or all the hoes simultaneously, when constructed and arranged substantially in the manner and for the purposes described.

And I also claim, in combination with the pairs of hoes so hung and operated, the shields, L L, for protecting the young plants from the sods, earth, or soil turned up by the hoes, substantially as set forth.

### 27,704.—Frank Douglas, of Norwich, Conn., for an Improvement in Steam Engines:

I claim the plate, E, in combination with the valve, G, the spring, F, and the bar, A; the whole constructed to operate substantially as set forth.

[An engraving and description of this invention will shortly appear in our columns.]

### 27,705.—Nathaniel Drake, of Newton, N. J., for an Improvement in Corn-shellers:

I claim the arrangement and combination of the oblique-acting adjustable spring, E, set screw, k, plate, E, and adjustable guard chain, j, as and for the purposes shown and described.

[This invention relates to an improvement in the old and well-known class of corn-shellers in which the corn is shelled by means of toothed wheels and a pressure plate or bar, the latter part of the device serving to keep the ears in proper position while being acted upon by the wheels. The object of the above invention is to render this pressure plate or bar capable of yielding or giving to the ears, in such a manner that it will keep both large and small ears properly presented to the wheels, so that both will be perfectly shelled, and at the same time be allowed to yield to large ears without offering such a great resistance as in the machines hitherto constructed.]

### 27,706.—Asahel K. Eaton, of Kings county, N. Y., for an Improvement in Vulcanizing Caoutchouc:

I claim the new method of applying heat to india-rubber or allied gums, when the same are ready for being vulcanized, by the employment of a saline bath, as set forth.

### 27,707.—A. K. Eaton, of New York City, for an Improvement in the Manufacture of Steel:

I claim the conversion of cast iron in its solid form into steel, and the simultaneous purification of the same by treatment with the hydrates or carbonates of soda and potash, either alone or combined substantially as described.

### 27,708.—Daniel D. Farnham, of Johnstown Center, Wis., for an Improvement in Well Buckets:

I claim hanging the buckets by chains, D, when the bails are attached to the ends of the buckets below and in front of the succeeding chain, in combination with the holding pins, h, and hooked arm, c, as described and represented.

[This invention consists in giving to the well buckets a peculiar shape, in connection with a novel mode of hanging them, whereby they will more readily enter the water, and emerge therefrom; and it also consists in arranging on the end of each bucket a suitable pivoted hook which will attach itself to the cross bar of the bail as the buckets descend and turn the bucket while in the water, and keep it in the desired position for holding water while it is being elevated, and thus prevent it from casually upsetting before it reaches the discharge spout in the curb.]

### 27,709.—Moses French, of Leesville, Ind., for an Improved Millstone Bush:

I claim the employment, in combination with the box, A, and spindle, B, of the adjustable plungers, F, and oil channels, i, substantially as and for the purpose set forth and described.

[The object of this invention is to obtain a bush for millstones that will be self-adjustable, or in other words, one that will compensate automatically for the wear of the wedges and at the same time afford facility for the ready lubrication of the spindle. The invention consists in the employment of wedges arranged in a peculiar way with springs, whereby a perfect bearing on the spindle is obtained, wear being compensated for, and using in connection with the above parts oil chambers provided with plungers, and arranged in such relation with the wedges and spindles as to afford a facile mode of lubrication.]

### 27,710.—Robert George, of Mineral Point, Wis., for an Improvement in Metallurgic Operations Applicable to certain Ores of Zinc, Lead, Iron, Cobalt and Nickel:

I claim the peculiar combination and arrangement of the several parts of the furnace, as described, with the application of steam for de-sulphurating sulphuret of zinc (blende black-jack) and sulphurous ores, sulphates and sulphurets of iron, nickel, cobalt, copper and lead, as described and for the purpose set forth.

### 27,711.—Harvey Guild, of New Orleans, La., for an Improvement in Siphons attached to Gas Retorts:

I claim the annular siphon composed of an upright cup, A, with a flaring or funnel-like mouth and central tube, a, and a movable inverted cup, D, provided with projections, c c, by which it is enabled to be supported by the flaring or funnel-like mouth of the cup, A, as described.

[This invention consists in a siphon of annular form, constructed in a novel and simple manner, which enables it to be taken apart very conveniently for cleaning or for any other purpose.]

### 27,712.—Albert Gummer, of Indianapolis, Ind., for an Improvement in Automatic Grain Scales:

I claim the arrangement of the double box beam, with its vertical stem, T T, for moving the horizontal slide valve, the two side rods, L L and J J, with their sliding weights, C C and D D, and the inclined planes, M M and N, for checking the said weights, as described.

### 27,713.—James F. Gyles, of Gilmer Township, Ill., for an Improvement in Seeding Machines:

I claim, first, The stud and angular slot or bayonet catch, b, Fig. 1, when combined with the revolving arms of a rotary seed sower, in the manner set forth.

Second the combination of the transverse partition, h, Fig. 3, and the inclined partition, g, Fig. 3, in manner and for the purpose specified.

### 27,714.—John C. Hall, of Fayette, Miss., for an Improvement in Buckles:

I claim the combination of the ends of the belt, band or hoop, f g, with a frame, A, and bar, B, in the manner and for the purpose substantially as shown and described.

[The object of this invention is to obtain a buckle or fastening which may be attached, without stitching or sewing, to the ends of the band, belt or strap it is to connect, and not only form a secure and permanent fastening, but also one which will readily admit of the band, belt or strap being taken up or shortened as occasion may require.]

### 27,715.—Joshua Hathaway, of Marietta, Ga., for an Improvement in Devices for Converting Reciprocating into Rotary Motion:

I claim the arrangement and combination of the reciprocating sliding rod, G, rotary flanged wheels, A A', shaft, B, independent pulleys, C C', and hinged bars, D, constructed and operating substantially in the manner and for the purpose specified.

[An engraving and full description of this invention will be found on another page.]

### 27,716.—Theodore Augustus Helwig, of Minersville, Pa., for an Improvement in the Manufacture of Prussian Blue:

I claim the application of mine water, containing sulphates of iron and free sulphuric acid, in the manufacture of Prussian blue, or any other native mineral water containing iron, and which will produce the intended effect.

### 27,717.—Joseph C. Henderson, of Albany, N. Y., for an Improvement in Cooking Stoves:

I claim, first, The ash tube, t, combined with the opening or openings, l l, into the oven, as specified, whereby I am enabled to convey ashes from the box, s, to the front hearth, f, in stoves having a descending front draft entering the oven, in the manner and for the purposes set forth.

Second, I claim the air space formed between the plates, n and o, combined with the air space, 3, when the air passes in at the opening, 2, for the purposes and as set forth.

Third, I claim admitting air to the fire from the space, 3, by the opening, 4, between the lower end of the plate, p, and the grate, r, as and for the purposes specified.

### 27,718.—Samuel B. Hopkins and Edward H. Anderson, of Easton, Md., for an Improvement in Vapor Burners:

We claim the original arrangement and combination of parts, as above set forth, viz., the attachment of the burner, B, the circular convex plate, C, and the circular, D, all as set forth, forming a distinct apparatus, capable of being attached to the ordinary slide, A, of a single tube fluid lamp, by which a light equal to that given by four ordinary tubes combined is obtained, with one-third the amount of oil, all operating and constructed as set forth.

### 27,719.—John E. Kelly, of New York City, for an Improvement in Riding Saddles:

I claim the application of a brake to a saddle, so constructed and arranged as to operate substantially as set forth and for the purposes and uses specified.

### 27,720.—Adam Humberger, of Somerset, Ohio, for an Improvement in Corn Harvesters:

I claim, first, The sectional platform, P, arranged upon the frame, and pivoted as described, in combination with the rear-end gate, for operation in the manner and for the purpose specified.

Second, The arrangement of the spring guards, D and H, and knife, R, in combination with the cutting apparatus, as constructed and applied and operating together in the manner and for the purpose specified.

### 27,721.—Charles B. Hoard, of Watertown, N. Y., for Improved Means of Winding the Spring of Clocks by Currents of Air:

I claim winding the spring of a clock, or other time-piece, by connecting it with an air wheel or motor, so constructed and arranged as to be actuated by currents of air.

### 27,722.—Christian Kramer, of Alleghany, Pa., for an Improved Sausage-stuffer:

I claim the arrangement of the gatherer, n, and feed-piece, o, in the hopper, b, wheels, m, and vertical screw, l, arranged, constructed and operated as described and for the purpose set forth.

### 27,723.—James Letort and H. S. Matthews, of Wytheville, Va., for an Improvement in Breech-loading Fire-arms:

We claim the combination and arrangement of the compensating slotted sliding lever guard, g g h J K, with the jointed or hinged rammer, m, the sliding lifting connecting rod, O P, the slotted stock, b b b X X, sliding, shifting, tilting or jointed barrel, d d d y y y, and breech-loading gun or fire-arm, substantially as set forth and described, or in any equivalent manner, whereby the several offices or functions are performed, as set forth, at one and the same time, through the operation or agency of the guard of a gun.

### 27,724.—Peter Low, of Cincinnati, Ohio, for an Improvement in Furnaces:

I claim, first, In combination with the air-heating chamber, Q, the fire-pot, A, flues, J, gas chamber, I, cylinder, K', and smoke-pipe, K, the whole being constructed and arranged in relation to each other, substantially as set forth.

Second, I claim the arrangement of the ventilating pipe, T, gas chamber, I, and smoke pipe, K, said ventilating pipe, T, which leads from the floor of the apartments to be ventilated, being made to pass through the inner space, Q, of the furnace above the gas chamber, I, and along side and in close proximity to the smoke pipe, and thence into the chimney, for the purpose of carrying off the vitiated air from the apartments, as specified.

### 27,725.—Geo. W. Lane, of Boston, Mass., for an Improved Apparatus for Testing Hollow Floats for Steam Boilers:

I claim the said float-testing apparatus, to operate in manner and constructed substantially as described, and either with or without either or both the steam and water pipes, G and I, furnished with stopcocks, M N, as specified.

### 27,726.—Thomas Lewis, of Malden, Mass., for an Improved Sugar-holder and Distributor:

I claim the combination of a receptacle, a, with a spring, k, and pocket, e, when the latter is arranged substantially as and for the purpose specified.

### 27,727.—C. B. Mallory, of Fredonia, N. Y., for an Improvement in Straw-cutters:

I claim the arrangement of the cylinder, N, and teeth, g, when they are operated from the same crank in the following manner, to wit, the latter being operated directly from the crank, b, and the former

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operated from said crank through the medium of the cross bar, f, rack, M, pinion, P, ratchet, q, and pawl, r, substantially as described.

I further claim the suspending of the rack, M, to the shaft, l, of the cylinder, N, by means of the support, j, and connecting the platform, O, to the cylinder, substantially as described, so as to admit of the rising and falling adjusting movement of the cylinder without interfering with the diving mechanism thereof.

[The object of this invention is to obtain a positive automatic feed attachment, so arranged as to insure an even or regular feed of the whole mass to be cut within the feed-box, the feeding device being capable of adjusting itself to the varying thickness of the layer within the feed-box without at all affecting the perfect operation of the feeding device.]

### 27,728.—Samuel W. Marsh, of Washington, D. C., for an Improved Compound Lock and Label Sheath:

I claim the construction of a compound lock and safety label sheath, or label case and label, as represented in the drawings, Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and substantially as set forth and described.

### 27,729.—William D. Mason, of Jarrett's Depot, Va., for an Improvement in Machines for Sowing Fertilizers:

I claim the arrangement of the screw, S, hopper, H, with its offset, O, and inclined plane, D, gear wheels, c c', driving wheels, W, and frame, F, as set forth, the discharge taking place under the offset of the hopper, as described.

### 27,730.—Thomas J. Mayall, of Roxbury, Mass., for an Improvement in Machines for making Rubber Belting:

I claim, first, The new mode described of forming a series of machine belts or bands at one operation, the same consisting in rolling the india-rubber or gutta-percha into two or more sheets, sufficiently wide to form two or more belts at a time, and upon the strips of fabric that compose the inner body of the belts, and then nipping the said sheets together and drawing them around the edges of the belts by the mechanical devices described, so as to completely encase the inner body of the belts, substantially as set forth.

Second, The peculiar-shaped formers, h h, operating as described, to unite the two sheets of india-rubber or gutta percha, and also to form the edges of the belts, as described.

Third, The cutters, i i, so arranged and operated as to run at different speeds and produce a shear cut upon the rubber or gutta-percha, substantially as described.

### 27,731.—Edward Maynard, of Brooklyn, N. Y., for an Improvement in Carriage Springs:

I claim the double-curved or wing-shaped spring, c, formed with separated leaves, as set forth, and connected at the center part to the axle by means of the curved chair clip, or its equivalent, and by eyes at the ends to the bolts, l l, or body loops, substantially as and for the purpose specified.

I also claim the chair clip, d, to which the spring is firmly bolted, and which is attached to the axle by the two clip pieces, 3 3, whereby the axle is not injured by bolt holes for the springs, and the weight is distributed on said axle, as specified.

### 27,732.—Oscar F. Morrill, of Boston, Mass., for an Improvement in Vapor Burners:

I claim my improved arrangement of the tubular rotary cut-off and its elevating spring, with reference to the jet tube and the screw cap, such cut-off being provided, or not, as circumstances may require, with a device for moving it both laterally and longitudinally, and such device being arranged at its lower part, substantially as described.

### 27,733.—John D. Murphy, of Baltimore, Md., for an Improvement in Wheels for Flying Artillery Carriages:

I claim, first, The combination of the solid hub, C, with the spokes, B, substantially as set forth.

Second, I claim the combination and arrangement of the flange, D, or its equivalent, with the hub, C, substantially as set forth.

### 27,734.—Thos. M. Mullen, of Philadelphia, Pa., for an Improvement in the Framing of Railroad Cars:

I claim the longitudinal beam, C, composed of two strips, a and a', with intervening packing pieces, b, in combination with the diagonal braces, M and M', the whole being constructed and arranged in respect to the king bolt, substantially as and for the purpose set forth.

### 27,735.—Edmund Munson, of Utica, N. Y., for an Improvement in Grinding Mills:

I claim, first, The arrangement of the driver, M, relatively as shown, with the apex of the spindle, F, to cause the apex of the spindle and the bearing surfaces of the arms, v v, of the driver to be in one and the some plane, and thereby admit of a universal adjusting movement of the runner, C, to preserve the parallelism of the two stones, as set forth.

Second, The collar, I, attached to the spindle, F, perforated with holes, l, in combination with the tube, k, attached to and placed centrally within the box, J, the perforations or holes, l, being above the bearings, h, and below the top of the tube, k, to operate as and for the purpose specified.

### 27,736.—Julius Pollock, of Morrisania, N. Y., for an Improvement in Ventilators for Hats:

I claim, in combination with a hollow inflated cushion, the employment of tubes or corrugations for the passage of air, and so placed in the hat as to fit in the cavities of the head over the temples, as described, and for the purpose set forth.

### 27,737.—Ruel Rawson, of Quincy, Mich., for an Improvement in Car Couplings:

I claim the arrow-headed bars, B, springs, d, standard, S, and casing, A, in combination with the guard bar, G, arranged and operating substantially as set forth.

### 27,738.—Harvey Rice, of Concord, N. H., for an Improvement in Railroad Axle Boxes:

I claim the combination of the inner packing applied to the axle at the smallest part of the conical surface, substantially as described, in combination with the axle having the said conical surface and the box with its outer packing, substantially as and for the purpose specified.

### 27,739.—Cornelius J. Rooney and David Renshaw, of New York City, for an Improved Pen Stand:

We claim the pen stand or pen rest, as described, made by arranging the series of converging or conical and open-bottomed cups, 5 5, over the series of cups, 6 6, one or both of these series of cups being so attached as to be readily removable to facilitate the cleaning of the lower cups, substantially as and for the purpose set forth.

### 27,740.—Alonzo R. Root, of Canton, Mo., for an Improvement in Seeding Machines:

I claim, first, The construction and arrangement of the inner cylindrical, distributing device, E, with the outer cylindrical case, D G', flap valve, L, axle, A, and cut-off, I, substantially as and for the purposes set forth.

Second, Combining the double spiral spring, N, valve, L, pivot, k, and flap, M, in the manner described and for the purpose set forth.

Third, Arranging the revolving weed cutter, T, in front of each plow, the shaft of which has its bearing in the front part of the plow in such a manner that the cutter rod may also serve to lift the plows over obstructions, all as described and for the purposes set forth.

### 27,741.—James K. Ross, of Lebanon, Ohio, for an Improvement in Fire-places:

I claim the arrangement in the rear of an open fire-place, C, of a heated chamber, F, vaporizing apparatus, I J K, and registered communications, G N L M M', with both the external and the internal air, as and for the purposes set forth.

### 27,742.—Solomon N. Sanford, of Cleveland, Ohio, for an Improvement in Apparatuses for Starting City Railroad Cars:

I claim, first, The use of the spring, V, when attached to notch, R, in order to release itself under high tension, thus checking the running gear without breaking the spring, substantially as set forth.

Second, I claim the arrangement of the drum, D, provided with the two independently revolving heads, C and C', in combination with the spring, V, and axle, X, all operating together with the dogs, T and U, substantially as set forth for the purposes specified.

Third, I claim the peculiar arrangement of the friction clutches, E and F, arms, G, ratchet bar, H, pinion, I, and shaft, K, in combination with the drum, D, spring, V, and axle, X, substantially as described for the purpose set forth.

### 27,743.—Thomas Snowdon, of Pittsburgh, Pa., for an Improved Feed-water Arrangement for Steam Boilers:

I claim locating a feed-water pipe within the steam space of the boiler, and having one end of said pipe communicate with the feed pump or doctor, and the other end dip down into the water space, as and for the purposes set forth.

### 27,744.—Jeremiah Stever, of Bristol, Conn., for an Improvement in Portable Stamping Machines for Crushing Stones, &c.:

I claim the combination and arrangement of the carriages, S P Q R, boiler, T, oscillating engine, U V W, pulleys, H J G, gearing, K L M N O, and stamping device E A B C F, in the manner and for the purposes set forth.

### 27,745.—David H. Smith and E. E. Smith, of Glenn Spring, S. C., for an Improvement in Plows:

We claim the arrangement of the moldboard, A a, reversible cutter, C, wedges, i i, inclined and slotted foot, B, standard, E, with shoulder, Z, and screw, H, and the brace, J, with inclined screw-threaded ends, I I, the whole substantially as and for the purposes set forth.

### 27,746.—H. G. Smith, of Muscatine, Iowa, for an Improved Metal Head for Brooms:

I claim forming the broom and brush head of two parts, A A, constructed as shown, and connected by the lips, b c, and keys, d, substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient cast iron head for holding a broom or brush, and serving as a means to connect the same to a proper handle. The invention consists in the employment or use of the cast iron plates connected together by keys and lips and forming sockets—one to receive a handle and another to receive the broom or brush.]

### 27,747.—Joseph Smith, of New York City, for an Improved Curtain Fixture:

I claim the combination of the hooked pawl, with its grooved pulley, H, spring, J, and ratchet wheel, P, arranged and operated with one cord, so as to raise, lower, or stop the curtain at any desired point, as described and represented.

[This invention consists in applying to the end of the curtain roller a ratchet wheel, and in combining with this wheel a peculiar shaped pawl that is pivoted to the window frame over the ratchet wheel, said pawl carrying on one end a grooved pulley over which the roller cord passes A spring is applied to the pawl for keeping it in gear with the ratchet wheel. The operation is simply to draw on the cord, until the pawl is disengaged from the wheel, when the curtain may be rolled up or drawn at pleasure.]

### 27,748.—S. P. Sweeney, of Columbia, Texas, for an Improvement in Cotton Seed Planters:

I claim, first, The adjustable, oscillating, planting apparatus, A, constructed and operating as described.

Second, The combination of the stirrer, h, and agitator, A, as described.

Third, The arrangement of coverer, D, driving wheel, W, hopper, H, cutters, C C, stock, P, and opener, O, as and for the purposes set forth.

### 27,749.—A. W. Tanner and O. P. Gorton, of Paw Paw, Mich., for an Improved Window Curtain Fixture:

We claim, first, The employment of the wheel, d, when the same shall be constructed and used, substantially as and for the purpose specified.

Second, We claim the spools, a a, pulleys, b b, and cords, m and n, in combination with a wheel, d, the whole being constructed and arranged substantially as and for the purpose set forth.

### 27,750.—T. R. Taylor, of Cleveland, Ohio, for an Improved Horse-shoe Machine:

I claim, first, The combination of a reciprocating male die, N, a reciprocating female die, O, and a pair of recessed, reciprocating, and swinging jaws, R R, the whole arranged and operating in relation to each other, substantially as described.

Second, The combination of the projections, 10, 10, on the male die, and the recesses, 11, 11, in the female die, operating together, substantially as described, to produce the heel calks on the shoe.

Third, The combination of the recesses r r, in the swinging jaws, R R, and the recess, f, in the female, die, O, said recesses operating in conjunction with the other parts of the jaws and female die, as described, to produce the toe calk.

Fourth, Effecting the closing of the swinging jaws, R R, by their descent into an opening, v v, in the bed-plate of the machine, substantially as described.

Fifth, The attachment of the movable cutter, U, to a slide, U', arranged and operated by the mandrel of the male die, N, substantially as specified,

[This invention consists in a novel system of dies, and in certain means of operating the same to forge a shoe with front and back calks by a continuous operation. Drawings would be necessary to explain the invention fully.]

### 27,751.—A. L. O. Wall, Geo. Roberts, and M. S. Carter, of Decatur, Ill., for an Improvement in Mole Plows:

We claim the ovoid-shaped mole, in combination with the scooping flanges, substantially as described for the purposes set forth.

### 27,752.—P. L. Weimer, of Lebanon, Pa., for an Improvement in Governor Valves of Steam Engines:

I claim the combination and arrangement of a self-adjustable cut-off valve by means of the shaft, S, and arm, T, latching into the latches, H, and adjusted by the governor attached to the arm, W, operating the shaft, by means of an eccentric, X, working in the frame, R, in such manner that when the engine slightly changes its speed, the shaft, with its arms, T, will be moved from or towards the latches, H, substantially as more fully described.

### 27,753.—J. W. Wetmore, of Erie, Pa., for a Legislative Voting Register:

I claim, first, Arranging the names of the voters in a series of blocks or types, each of which moves independently of the others, and is under the exclusive control of the voting member himself, for the purpose set forth.

Second, The combination of the printing mechanism with the balloting mechanism, when the two are arranged in such manner as to be operated simultaneously by the same mechanism, for the purpose set forth.

Third, Constructing the ballot boxes of such capacity as to contain but one ballot ball at a time, when the same are provided with doors, escape of slides, or valves, at top and bottom, to prevent the entrance or more than one ballot ball at each vote.

Fourth, Constructing the ballot-boxes with an entrance door, slide or valve, under the control of the speaker, or other proper officer, and an exit door, slide, or valve, operated by and under the exclusive control of each voter, for the purpose described.

Fifth, An automatic counting or registering apparatus, operated by clockwork, or its equivalent, to indicate optically the number of votes cast.

Sixth, The combination of the balloting mechanism with the counting or registering mechanism, when arranged in such manner that the latter is operated by the passage of the ballot balls from their boxes into some suitable receptacle for the purpose described.

Seventh, The combination of a printing mechanism, a balloting mechanism, and a counting or registering mechanism, when the same are arranged for joint operation, in such manner that each one serves as a check, whereby to ascertain the accuracy of the operation of the others.

### 27,754.—W. W. Williams, of Elizabeth City, N. C., for an Improvement in Sowing Machines:

I claim the arrangement of hoppers, H, box A, partition, P, frame, C, straps, R, and wheel, W, placed on an ordinary or common cart, operating as described and for the purposes set forth.

### 27,755.—L. W. Boynton, of New York City, assignor to himself and Durham & Booth, of New Haven, Conn., for an Improvement in Attaching Thills to Vehicles:

I claim the use of the hook and eye, in combination with the flanged plate and rubber, when the pressure of the rubber against the eye is regulated by means of the flanged plate, with its screw bolt, and the whole is constructed and made to operate substantially as described.

### 27,756.—Chas. Deidrich and Wm. T. Slocum (assignors to J. T. Mason & Co.) of Philadelphia, Pa., for an Improved Machine for Making Metal Caps for Boxes:

We claim, first, The shoot or conductor, S, with its bent tongue, Z, its inclined side, vertical chamber, and opening, x, the whole being constructed as substantially as set forth and arranged in respect to the die, f, of the punch, e, and the die, q, of the rod, q, as specified.

Second, I claim the rod, Q, and its die, q, with the central opening for the rod, t, the whole being arranged in respect to the vertical chamber, the shoot, S, and its opening, x, and operating as and for the purpose set forth.

### 27,757—Geo. Fetter (assignor to himself, Edw. Jones, and J. P. Cowley), of Philadelphia, Pa., for an Improvement in Cutting Apparatus for Harvesters:

I claim, first, Arranging the vibrating knives upon separate inclined planes, so formed on the cutter bar that the said knives may underlap and overlap each other in the manner specified.

Second, I claim the driving bars, C and D, with their respective projections, or equivalents thereto, in combination with the inclined knives and their forked shanks, the whole being arranged and operating substantially in the manner and for the purposes set forth.

### 27,758.—F. G. Johnson, of Bellwood, Sag Harbor, N. Y., assignor to himself and D. F. Tompkins, of Newark, N. J., for an Improved Wind Machine for Pumping Water:

I claim the wind surface, A h, in combination with the vane, b, connecting arm, k f, rod, c, and weight, g, the whole constructed and operated in the manner and for the purposes set forth.

### 27,759.—Alex. McElroy and R. B. McElroy (assignor to R. B. McElroy), of Waupun, Wis., for an Improvement in Seeding Machines:

We claim the arrangement of the deflecting boards, G' and H, the rod, N, and the seed hopper, provided at its bottom with the vibrating agitator, V, and seed slide, E, in which are cavities, o, and openings, e, the whole being used substantially as and for the purpose specified for scattering the seed broadcast.

### 27,760.—John McMurtry, of Fayette county, Ky., assignor to G. B. Kinkead, of Lexington, Ky., for an Improvement in Operating Hoisting Wheels:

Claim—The removing the pinion, g, entirely out of gear with the spur wheel, f, on the roller shaft, so as to permit the spur wheel, f, to turn freely, and at the same time, at will, either to let the pinion, g, rest between the gearing of the fast and slow motion or cause it to pass immediately in gear with the fast or return it to the slow motion, substantially as described and for the purposes set forth.

### 27,761.—Thomas Newlove (assignor to himself, James Bowley, and T. Lynch, Jr.), of Chicago, Ill., for an Improvement in Sewing Machines:

I claim the combination of the sheathed guide lever, l, with the straight looper, n', substantially in the manner described, and for the purpose of securing a positive forward and back as well as a positive lateral movement to the looper.

### 27,762.—John Stevens (assignor to H. Brind), of New York City, for an Improvement in Mechanism for Threading Sewing Machine Needles:

I claim, first, The combination and arrangement of the perforated piece, 3, provided with a set screw, or other convenient means of attaching it to the needle with the arm, 6, jointed to the piece, 3, as described and shown, in such a manner as to furnish a ready and convenient means of securing the accurate adjustment longitudinally with the needle, to cause the hook, 7, to enter the eye of the needle, as set forth.

Second, The combination with the arm, 6, containing the hook, 7, of the flanges, 8 8, to secure the properlateral adjustment of the hook, substantially as set forth.

Third, The combination with the folding arm, 6, and with the needle-beam, of the spring, 9, substantially as and for the purpose set forth.

### 27,763.—Wm. Thomas (assignor to himself and Wm. Webb), of New York City, for an Improvement in Machines for Molding Candles:

I claim, first, The pouring pan fitted with holes so formed as to enclose in combination with the wickholders, the top of each mold, as described.

Second, I claim the arrangement of the wickholders upon slides, so as to be capable of shifting the wicks to one side of the molds for facilitating the free entrance of the tallow, as described.

Third, I claim the supporting frame, operating in combination with the discharging apparatus, and with the wickholders for raising and supporting the candles after they are discharged, as described.

### 27,764.—G. W. N. Yost (assignor to G. W. N. Yost & Co.), of Yellow Springs, Ohio, for an Improvement in Corn Planters:

I claim the arrangement of the cams, G, slides, F, and crank pin, H, in connection with the radial arms, C, in the manner and for the purposes substantially as described.

## RE-ISSUES.

### Warren Gale, of Chicopee Falls, Mass., for an Improvement in Straw-cutters. Patented Sept. 12, 1854:

I claim, first, The arranging of the flange or flanges on one cylinder, so that they will meet the knife or knives on the other cylinder, as the two cylinders rotate, substantially in the manner described; and this I claim whether the flange is or is not made of, or armed on its face with, soft material.

Second, I also claim, in combination with the flanged cylinder, the throat, placed in such relative position to said cylinders as to nearly meet the latter at a desired point in their revolution; thus assisting to give a long cut if said throat be expanded, and a shorter cut when the throat is contracted, substantially as described.

### Abraham R. Hurst, of Chambersburg, Pa., for an Improvement in Manure Excavators. Patented Aug. 29, 1854:

I claim, first, The employment of the hinged pitchfork or rake, having an oblong slot, e, and a stop notch, g, in its handle, E, in combination with the curved hinged locking bar, F, and a draft bar, B a, substantially as and for the purposes set forth.

Second, The combination of the devices mentioned above with a sled or carriage, A, substantially as and for the purposes set forth.

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Robert Marcher, of New York City, for an Improvement in Machines for Enameling Moldings. Patented July 26, 1859:

I claim the combination of the mechanism, or the equivalent thereof, for propelling the molding with the plate, the edge of which is formed the reverse of the molding, to strike off the surplus enameling and to rub it down, and with the bed or gage which sustains the molding in its proper relations to the said plate, substantially as and for the purpose specified.

I also claim, in combination with the combination above claimed, the employment of the side plates at the sides of the molding, substantially as and for the purpose specified.

And I also claim, in combination with the parts enumerated as claimed in combination in the second of the above claims, the employment of the other of the plates specified as having its lower edge of the reverse form of the molding, substantially as and for the purpose specified.

And finally, I claim making each of the said end plates and each of the said side plates, or all of them, self-adapting by yielding pressure, substantially as described, when combined with the mechanism, or its equivalent, for feeding the molding, and with the bed or gage, substantially as and for the purpose specified.

George K. Snow, of Watertown, Mass., for an Improvement in Machines for Folding Paper. Patented Oct. 15, 1850:

I claim, first, A slotted plate, B, table or contrivance, for receiving and supporting the sheet; second, two parallel planes or plates, L M, extending at right angles from such support, and so arranged that there shall be one of the said plates on each side of the slot, p, of the first element or support of the sheet; third, a striking and folding frame or plate, D, so arranged and operated as to press the paper against the middle or other proper part of it, force it downward through the slot and between the two parallel plates; the said parallel plates operating to complete the fold and held the sheet of paper during the return or retrograde movement of the striking frame or plate.

And, in combination with the above, I also claim a second striking and folding plate, N, arranged at right angles to the said two parallel plates, and made so as to pass or operate through them or their slots, and directly after the said retrograde movement of the first one, as to press against the sheet of paper and force it through one of the said slots, and thereby once more, or a second time, fold it.

And I claim, in combination with such second combination of mechanism, a third striking and folding plate, R, and slotted parallel folding plate, S, and friction rollers, p q, or equivalent contrivances; the same being for supporting the twice-folded sheet of paper, folding it a third time, and subsequently discharging it; such discharge taking place in consequence of the return or retrograde movement of the striking or doubling plate, as described.

I also claim the combination of one or more registerpoints or registering apparatus with the sheet-receiving table or platform, and an apparatus for producing one or more folds in the sheet.

I also claim a combination composed not only of machinery for folding sheets of paper, but machinery for receiving and piling or packing such sheets in a regular pile or pack.

I also claim the combination of mechanism which is applied to the striking plate and its rollers or folding contrivances, and used for packing the sheets; the said mechanism consisting of the stationary plate, T, and the spring plate, U, or plate and its spring, or other proper equivalents, which permit the recession of the plate in proportion as the pack of sheets increases in size; the whole being arranged and mode to operate substantially in the manner as specified.

I also claim the combination of one or more edge gages, C C1 C2, with the sheet-receiving platform and an apparatus for folding paper, substantially as described.

Wm. Wharton, Jr., of Philadelphia, Pa., for an Improvement in Dispensing with Switches on Railroads. Patented Dec. 13, 1859:

I claim the employment, in connection with the sidings or turnouts on railways, of supplementary inclined and elevated rails, in combination with car wheels, so constructed as regards the said inclined rails, which are so arranged as regards the rails of the siding or turnout, that the wheels may be elevated above, and free from, the control of the rails of one track and be placed under the control of those of another track, as set forth.

ADDITIONAL IMPROVEMENTS.

Robert Cartwright, of Ithaca, N. Y., for an Improvement in Canal Boat Propellers. Patented July 19, 1859:

I claim the arrangement of the shaft, F, to the ~~bed plate~~, R, being made attachable by means of the strap, J, so that the apparatus, as described in the patent to which this is an additional improvement, with the exception of the bed plate, may be taken out or put in its place without docking the boat.

James Emerson, of Boston, Mass., for an Improvement in Ship's Windlasses. Patented Aug. 28, 1855:

I claim, first, The ratchets, N and O, when made substantially as described and shown by the drawings for the purpose of controlling the gears, L and M, of my windlass.

Second, I claim combining the lever and screw for working the friction bands on my windlass, for the purpose and in the manner described.

H. P. Gatchell (assignor to E. J. Bates), of Ravenna, Ohio, for an Improvement in Coffee Pots. Patented Nov. 22, 1859:

I claim the special arrangement of the inclined planes or sections of screws, H and K, the bail, E, and the filtering cup for the purpose specified.

EXTENSIONS.

Alva B. Taylor, of New York City, for an Improvement in Checking the Momentum of Printing Presses. Patent April 4, 1846:

I claim the method described of arresting the momentum of the carriage which carries the form of types in printing presses, by means of plungers that compress air in cylinders only towards the end of the motions of the carriage, as described.

Joshua H. Butterworth, of Dover, N. J., for an Improvement in Door Locks. Patented April 11, 1846:

I claim the arrangement of the circular plate for elevating the tumblers into notches in the main bolt and raising and lowering the levers, Z Z, which act upon the movable talon, in combination with the movable talon and the preventive stop or flying tumbler, also set forth.

Thomas J. Wells, of New York City, for an Improvement in Sawmills. Patented April 11, 1846:

I claim the combination of the sliders with eccentric clamps, slightly pressed together, and so formed upon their faces that, however the thickness of the stuff may vary, the line, drawn as a radius from the face of the clamp at the point of contact with the stuff, shall always make nearly the same angle with the face of the material and the direction of the feed.

DESIGNS.

Samuel Armitage, of St. Louis, Mo., for a Design for a Trade-mark for Neuralgic Pills.

Samuel Boyd, of New York City, for a Design for Andirons. (2 cases.)

James C. Karr, of Williamson county, Tenn., for a Design for Coffins.

George W. Smith, of Hartford, Conn., for a Design for Ice Pitchers.

Theodore W. Lillagore (assignor to Savery & Co.), of Philadelphia, Pa., for a Design for Fire-dogs. (6 cases.)

David McNair, of Roxbury, Mass., assignor to the Roxbury Carpet Company, of Boston, Mass., for a Design for Carpets.

Charles Muller (assignor to John Mathews), of New York City, for a Design for Water-coolers.

Francis J. Pierce, of Lowell, Mass., assignor to the Roxbury Carpet Company, of Boston, Mass., for a Design for Carpets.

Joseph Rosenthal (assignor to Joseph Reckendorfer), of New York City, for a Design for Trade-marks for Lead Pencils.

Joseph Rosenthal (assignor to Joseph Reckendorfer), of New York City, for a Design for Stamping on Lead Pencils.

# Notes & Queries.

P. M., of N. Y.—A high pressure steam engine is one which works with steam without condensing. The pressure carried in such engines varies from 20 to 100 lbs; the most common pressure is about 40 lbs.

A. N., of N. H.—Ivory and ebony, for the keys of pianofortes, are polished with fine emery paper, and then rubbed up with whiting in the same manner that any hard unvarnished wood is polished.

T. S. B., of La.—The back volumes of the SCIENTIFIC AMERICAN are the source to which we can direct attention for illustrations and descriptions of sawing and shingle machines, and all other kinds of machines for working in wood.

A. E. D., of La.—The best work on electro-magnetism applied to telegraphing, &c., published in our language, is Shaffner's. The publishers in this city are Pudney & Russell, No. 79 John-street.

L. R., of Pa.—Partridge & Bros., Cliff-street, this city, are wholesale dealers in chemicals.

H. G. S., of N. Y.—Come to this city and you will see one of the English cast steel bells. When cast steel is melted and poured into a mold, it does not become pig iron—it is still cast steel. A broken steel bell may be sold for scrap steel; it is more valuable than pig iron certainly.

T. R. C., of N. Y.—It would take the space of a whole column to answer all your inquiries. We advise you to get Bourne's "Treatise on Propellers" and give it a thorough perusal. The subject of propellers is, as you say, one of great commercial interest, but it is not new. We have a great number of engineers and others who are perfectly familiar with it.

D. D., of N. Y.—A "unit of heat" means the mechanical energy required to raise the temperature of water one degree from 39° Fah. It means 772 pounds lifted one foot, and is called Joule's Equivalent, who found it by experiments on friction.

C. S., of Ga.—You will certainly raise more steam with a boiler 4 feet in diameter, 12 feet long and having 47 return 3-inch flues, than with your old 22-inch flue boiler. You may use your old engine and pump. We would advise you to superheat the steam slightly in carrying it from the boiler to the cylinder. It will save both fuel and feed water.

J. E. T., of N. Y.—The upper portion of a wagon wheel does move faster horizontally than the bottom.

L. W. A., of Texas.—In lithographing in colors, each color is printed from a separate stone; each stone being made of the full size of the print, and the color placed on it in the proper places.

H. C. P., of N. Y.—As your article on dialing would require an engraving to illustrate, we shall be obliged to pass it, at all events, for the present, as our artists are very much hurried just now.

I. S. B., of Pa.—A very thin coat of copal varnish applied to a clean iron pattern, and dried thoroughly in an oven, will endure for a long time, and prevent the pattern from rusting when used in a damp mold.

S. H. W., of N. Y.—Your alleged improvement in fire-escapes is not new. The same thing was patented in 1849.

J. A. A., of N. J.—If you boil cotton or linen cloth for half an hour in a weak solution of sumac and alum, or sumac and the sulphate of copper, then dry it thoroughly, it will endure four times longer when exposed to the weather than if it was unprepared.

E. B., of Md.—We are not aware of any experiments having been made to manufacture cast steel type. The nature of the metal, owing to its shrinking in the mold, would prevent it from having a fine-shaped edge.

J. W. M., of Mass.—The experiments with water wheels at Philadelphia are not quite complete; we shall present the report of them as soon as possible. Your water wheel is original, and if you can prove that it has advantages, a patent can be secured; but we do not think it is quite so good as some others which are more simple. Some of the wheels at Philadelphia gave considerably more than 80 per cent of power.

B. F. B., of Pa.—It would be practicable to fill the space between the plastering and siding of houses with sawdust or tan bark. In order to get the full benefit from it, great care should be taken to keep it dry, even from moisture soaking up from the bottom.

A. G., of Mass.—The motion of the planet Jupiter is westward in relation to the sun, but not in relation to the fixed stars; it is, however, as well as Saturn, nearly stationary, and this, of course, brings it at a given hour about one degree further west every night. The motions of the exterior planets are the same, not in a year, but in periods of time which are longer than a year.

C. M., of Mass.—Would it not be better to fill a vault with some disinfecting substance, such as charcoal dust, rather than attempt the difficult, if not impossible, task of making it air-tight? The charcoal, when fully impregnated, would be very valuable for manure.

W. P. De S., of ———.—Your article on the "Helicoidal Surface and its Development" is too purely mathematical for our columns. You had better send it to the "Mathematical Monthly," published by Ivison & Phinney, of this city.

J. W. P., of C. E.—We do not know where you can procure a tobacco-cutting machine; but presume an advertisement for it in our paper would attract the attention of some one who could furnish you.

C. H. W., of Mass.—Byrne's "Metal-workers' Assistant" will give you all the information regarding alloys of metals. It is published by H. C. Baird, Philadelphia.

O. S., of Conn.—New belts should be stretched before they are put on the pulleys; and when they become slack by running, they should be taken up, or else a friction pulley put on to make them "taut."

C. B. B., of Wis.—With the utmost care, it is scarcely possible to apply any varnish to a pencil drawing without soiling it. A weak solution of isinglass, however, is the best that is known to us. We have never seen gold leaf gilding successfully imitated by any varnish.

J. A. G., of Ohio.—There is no American work published on gas-lighting. Parnell's book on this subject was published several years since in London, and is a very good treatise. The subscription price of the "London Journal of Gas-lighting" is 18s. sterling per annum. It is published at No. 11 Bolt-court, Fleet-street, London.

J. C., of Ohio.—The triple or three-faced iron rail is an old invention. It was patented in England in 1846, and has frequently been shown to us since.

W. B. O., of Cal.—We do not believe a good egg-hatching machine can be obtained. We do not know of a single one in use.

## Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, April 7, 1860:—

J. D., of N. Y., $30; J. A., of Pa., $25; J. B., of N. Y., $30; J. R. B., of Ky., $35; F. T., of Ill., $30; S. M., of Va., $25; D. S., of N. Y., $30; A. & B., of N. Y., $100; D. A., of Ohio, $25; R. L. U., of N. Y., $10; B. H., of Conn., $30; J. J., of Ill., $25; E. B. C., of Fla., $25; W. B., of Ohio, $30; J. S., of N. Y., $30; M. B. T., of Mass., $30; H. M. W., of Conn., $30; J. S., of N. Y., $28; C. T. P., of N. Y., $58; S. W. B., of N. Y., $60. I. W. K., of Cal., $30; W. J. McC., of N. Y., $10. P. B., of N. Y., $30; H. A. M., of Ill., $35; N. & C., of Ga., $25; E. & D., of Mass., $25; J. W. H., of Ill., $30; W. J. A., of Tenn., $25; S. F. B., of Mass., $50; N. A. P., of Tenn., $30; S. A. G., of N. Y., $30; J. A. McL., of Ky., $10; L. H. F., of Pa., $20; A. W., of Conn., $30; A. K. T., of Mich., $25; H. & M., of Ohio, $25; L. H., of Conn., $30; H. W. A., of N. Y., $60; A. T. J., of Conn., $28; L. S. C., of N. Y., $58; D. H., of Mass., $30; C. E. S., of Wis., $15; J. & S., of R. I., $25; S. K., of Cal., $30; W. R. S., of Wis., $55; R. W., of Ill., $25; I. C., of Iowa, $25; L. O. C., of N. Y., $55; J. P. W., of Ky., $25; J. M. C., of S. C., $20; S. S., of Mass., $25; W. H. C., of Ill., $30; N. H. G., of Conn., $25; W, A. H., of R. I., $30; N. P., of N. J., $30; A. C. K., of N. Y., $30; C. B. M., of Ill., $20; C. G. & H. M. P., of Mass., $10; G. S., of Mass., $35; G. & W., of Tenn., $55; J. J., of N. Y., $25; T. M., of N. Y., $15; O. L. R., of Ga., $25; W. & K., of Iowa, $30; E. L. G., of Conn., $30; D. S. B., of N. Y., $25; A. W., of N. Y., $25; H. & W., of Ohio, $45; C. & B., of Ill., $64; J. A. S., of Wis., $10; J. J. McD., of Ill., $60; S. B., Jr., of N. Y., $25; J. H. H., of Vt., $32; J. G., Sr., of R. I., $25; A. H. H., of Ga., $10; R. C. B., of N. Y., $40; M. B., of Pa., $30; R. P. A., of N. Y., $28; M. C., of N. Y., $30; C. M., of N. Y., $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, April 7, 1860:—

D. H., of Mass.; J. J., of N. Y.; S. M., of Va.; N. & C., of Ga.; F. T., of Ill.; J. P. W., of Ky.; J. E. E., of Pa.; S. S., of Mass.; A. K. T., of Mich.; W. B., of Ohio; F. F. S., of Ill.; P. & C., of N. Y.; C. E. S., of Wis.; C. A. B., of Vt.; E. & D., of Mass.; H. A. M., of Ill.; W. D., Jr., of Pa.; W. J. A., of Tenn.; S. F. B., of Mass. (2 cases); E. B. C., of Fla.; H. E. & B., of N. J.; H. & M., of Ohio; J. H., of Mass.; J. A., of Pa.; J. W. K., of Cal.; J. & S., of R. I.; I. C., of Iowa; R. W., of Ill.; C. G. S., of N. C.; D. A., of Ohio; J. S., of N. Y.; A. W., of Conn.; J. J., of Ill.; J. A. McC., of Ky.; H. W. A., of N. Y.; L. S. C., of N. Y.; L. O. C., of N. Y.; J. G., Sr., of R. I.; J. W. C., Jr., of Ill.; S. B., Jr., of N. Y.; C. F. B., of R. I. (2 cases); H. & J., of Ohio; S. & O., of Wis.; O. L. R., of Ga.; C. E. G., of Minn.; R. P. A., of N. Y.; M. C., of N. Y.; A. W., of N. Y.; C. M., of N. Y.; S. W. B., of N. Y. (2 cases); A. C., of N. Y.

## Literary Notices.

CASSELL'S ILLUSTRATED FAMILY BIBLE.—We announced, a few weeks ago, the commencement of the publication of this famous work in the United States. Four parts only have been issued, but the demand has risen—so we are told—to 30,000 copies per number; in London the edition is said to be 230,000 copies. The parts already issued here sustain most fully the highly valuable character which the work presented to us on viewing the first number. The illustrations are profuse, and many of them are taken from paintings by the most celebrated masters, drawn and engraved in a superior style of art. Objection is sometimes made to subscriptions to serials, because, in not a few instances, the publishers have failed to complete the work, or carry it on in the style of the beginning. But no person who is at all acquainted with the immense resources of Mr. John Cassell's great publishing house in London, or with his world-wide reputation for vigorously carrying forward whatever enterprises his hands find to do, will be deterred, by reasons like those stated, from obtaining early possession of the numbers of this wonderfully cheap, but truly magnificent edition of the Bible.

THE GOLD FIELDS OF ST. DOMINGO. By W. S. Courtney, Esq. Anson P. Norton, publisher, No. 114 Nassau-street, this city.—This little book is very likely destined to change the fate of numbers of people, by luring them to the promising gold mines of the negro republic. It is very interesting, and is made intelligible by a map.

TREATISE ON PHOTOGRAPHY. By Charles Waldack, Cincinnati.—A cheap and complete elementary treatise, by a practical chemist and photographer.

HYGIENIC AND LITERARY MAGAZINE. M. A. Malmsby, editor and proprietor, Atlanta, Ga.—This new monthly is devoted to literature and that other subject on which all human happiness and well-being depends—obedience to the laws of health.

WEISSENBORN'S AMERICAN ENGINEERING, published in Fulton-street, this city, is the best and most recent work on the steam engine suitable for Americans.

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### Rates of Advertising.

THIRTY CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

## IMPORTANT TO INVENTORS.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the SCIENTIFIC AMERICAN, are happy to announce the engagement of HON. JUDGE MASON, formerly Commissioner of Patents, as associate counsel with them in the prosecution of their extensive patent business. This connection renders their facilities still more ample than they have ever previously been for procuring Letters Patent, and attending to the various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c., &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of fourteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

They are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. We think we may safely say that three-fourths of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the British law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office or either of the Branches. They also furnish a Circular of information about Foreign Patents.

The annexed letters from the last three Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours, very truly,
CHAS. MASON.

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## RECENT DISCOVERIES IN ELECTRICITY.

[Communicated.]

According to the *Annual of Scientific Discovery* for 1860, the researches made in the department of electricity, during the past year, have been most important; Messrs. Faraday and Grove, of England, occupying, as in years past, the most prominent position as investigators. The results of the experiments instituted by the latter gentleman are exceedingly curious, and must be regarded as all but proving the truth of the modern theory which assumes that electricity is not, in any sense, a material substance, but only an affection (state) or motion of the particles of ordinary matter. Thus he shows conclusively, by a great number of carefully instituted experiments that electricity cannot be conducted, or rather transmitted through a vacuum, and that in transmitting electricity through gaseous media, the facility of transmission is increased by a degree of attenuation in the media, but that when a certain point of attenuation is passed, transmission becomes difficult, and finally impossible. Now, if electricity be a subtle fluid flowing through matter, as the old theories had it, it would, we should suppose, fill up the vacuum (as running water fills up a depression in its channel) and pass on in the line of conduction; but as it does not thus act, the inference is unavoidable, that the presence of ordinary matter is necessary to its transmission, and that if space could exist void of matter, then there could be no electricity.

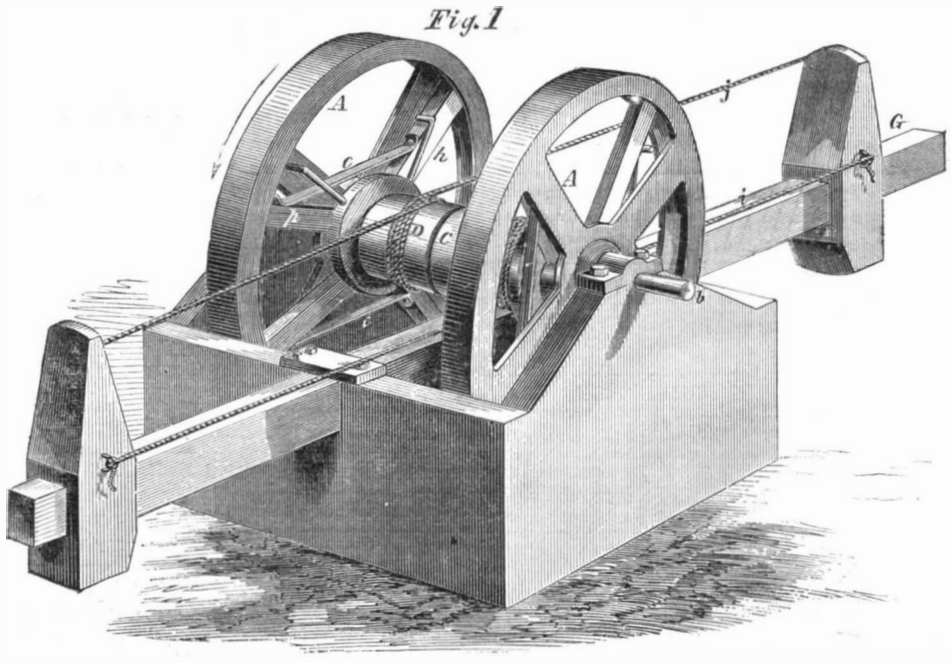
It is also extremely interesting to note how the establishment of one or two new facts in science, like those developed by Mr. Grove, speedily becomes the basis of new investigations, and the instrument for extorting fresh secrets from Nature. Thus the experimental result, that a certain degree of attenuation of air or gas forms a good conductor, or easy path for the electrical force, while either a greater or less degree of density offers more resistance, and this increasing toward either extremity of density or rarefaction, furnishes a possible method of determining the hight of the aurora borealis; since, if this beautiful phenomenon is due, as is generally believed to the circulation of currents of electricity to and from the poles of the earth, the hight where the transit of electricity takes place will be just that at which the density of the air is such as to render it the best conductor. This density being known from laboratory experiments, and the decrement of density of the atmosphere being in proportion to its distance from the earth, and capable of mathematical determination, the hight of the aurora is at once made probable, if not certain. Conversely, also, by ascertaining the hight of the aurora by parallax, *i. e.*, the angle subtended from different positions, we may be enabled to verify the calculated ratio of decrement in the density of the atmosphere as we recede from the earth's surface.

If electricity is unable to pass over or through a vacuum, it is probable that all the other so-called imponderable forces—light, heat, magnetism, and possibly attraction—obey the same law; and as these agencies freely travel the interplanetary spaces, the supposition of Newton that such spaces may be filled with an etherial form of matter receives an indirect but powerful support. Taken in connection with the long-recognized fact, that some comets are apparently resisted in their motions, as if by friction against the medium they traverse, this evidence in favor of Newton's suggestions becomes very strong, and will probably induce scientific men to generally admit, hereafter, that matter exists in four rather than three states of attenuation, viz., the solid, the liquid, the gaseous, and the *ethereal*.

## NEW MODE OF CONVERTING RECIPROCATING RECTILINEAR INTO ROTARY MOTION.

It is said that some of the early treatises on mechanics laid down the proposition that the loss of power in turning a crank, by means of a piston moving back and forth in a straight line, was one third. If such a statement has been published in any respectable work, it only shows to how great an extent certain mechanical delusions have prevailed in the world, for a very simple demonstration will satisfy any one that there is no loss of power whatever by the crank motion. There are, however, important objections to this mechanical device, one of the most manifest of which is the great strain on the parts in large engines; and in consequence of these objections numerous efforts have been made to devise other modes of converting rectilinear into rotary motion. One of the most ingenious of these devices is illustrated in the accompanying cuts. It will doubtless attract the attention of mechanicians, as the same idea may be made available in other combinations, especially to replace the ratchet and pawl in certain situations.

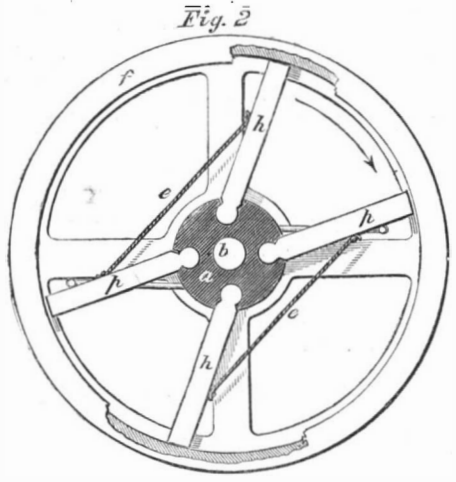
*Fig. 1*




### HATHAWAY'S METHOD OF CHANGING MOTION.

The two wheels, A A, Fig. 1, are rigidly secured to the common shaft, *b*, which has two pulleys, C and D, running loosely upon it. The two bands, *i* and *j*, are wound around the pulleys in opposite directions, so that, when the frame, G, is moved back and forth, a reciprocating rotary motion is communicated to each pulley, the

*Fig. 2*




pulley, C, turning to the right when the pulley, D, is turning to the left, and *vice versa*. Now, this invention consists in the plan by which each pulley is made to take hold of the wheel with which it is connected whenever it is turned in one direction, and to release its hold when it is being drawn back in the opposite direction, thus each pulley operating alternately to turn the common shaft. The plan is plainly shown in Fig. 2. Two arms, *h h*, longer than the radius of the wheel, have their ends, which are smoothly rounded, inserted loosely into the pulley, and their outer ends in contact with the inner surface of the rim of the wheel, which projects inward a sufficient depth for this purpose. The position of these arms is slightly inclined from the radius, so that, as the pulley is turned in the direction indicated by the arrows, the ends of the arms are pressed against the rim of the wheel, and the wheel is carried round. But when the pulley is turned in the opposite direction the ends of the arms fall away from the rim of the wheel, allowing the pulley to be turned back in a direction opposite to the motion of the wheel without any considerable friction.

In order to retain the ends of the arms in easy contact with the rim, ready to be brought to their bearings whenever the pulley is turned in the direction of the motion of the wheel, the light springs, *e e*, are attached to the arms and to the supplementary short arms, *p p*, the latter being prevented from turning over by the spokes, *r r*, which are inserted into the pulley.

The patent for this invention was obtained through the Scientific American Patent Agency, April 3, 1860, and the claims will be found on another page. Persons desiring further information in relation to it will please address the inventor, Mr. Joshua Hathaway, at Marietta, Ga.

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